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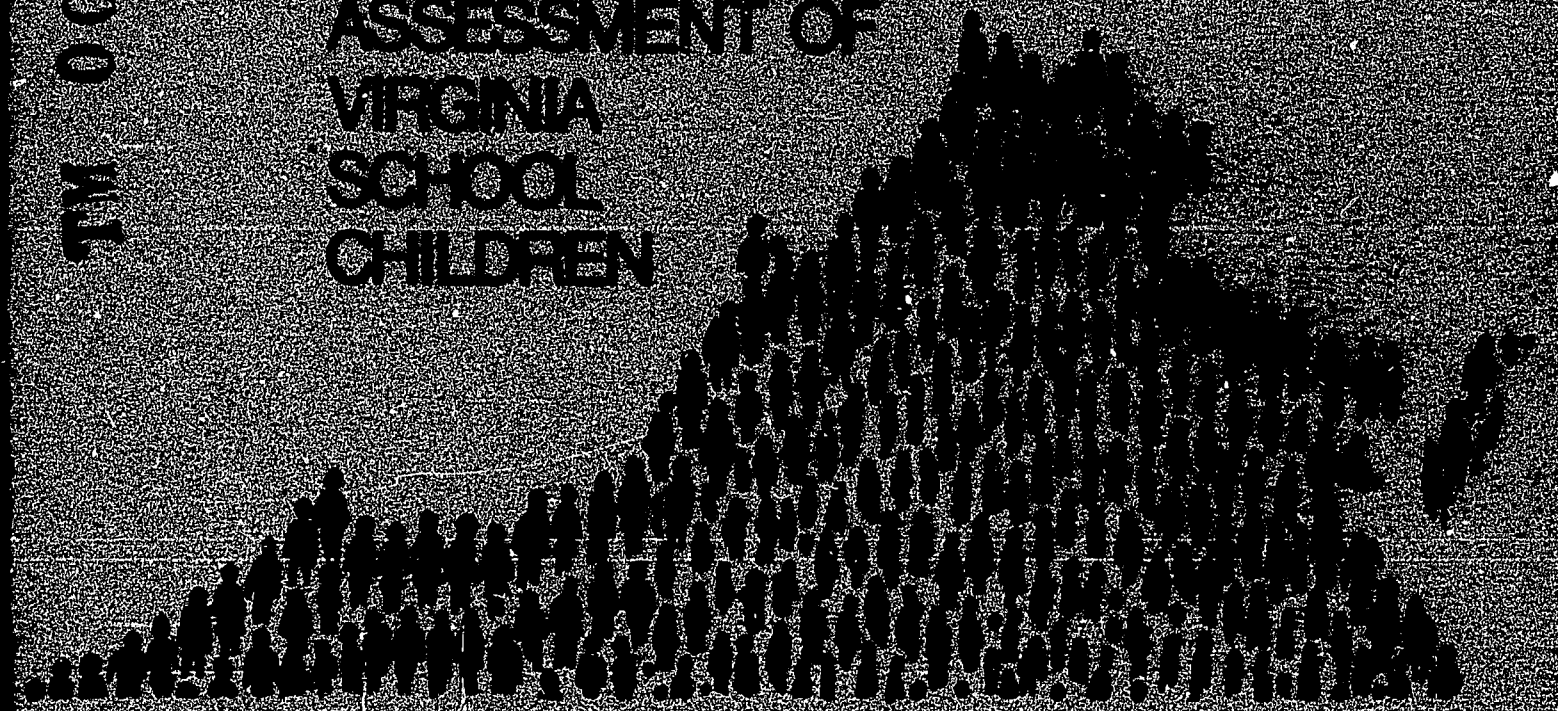
ABSTRACT

An effort to assess psycho-motor (P-M) needs among Virginia children in K-4 and in special primary classes for the educable mentally retarded is presented. Included are methods for selecting, combining, and developing evaluation measures, which are verified statistically by analyses of data collected from a stratified sample of approximately 4,500 children. A screening instrument to be utilized by classroom teachers in the identification of suspected deficiencies in P-M functioning was completed for an additional 1,803 children. A wide range of deficiencies in psycho-motor functioning were revealed in all grade levels examined. The pattern of incidence indicates that for a large number of children, continued improvement of P-M skills will not occur without intervention. On the basis of this study three major areas of concern require further attention: (1) teacher education geared toward awareness and development of P-M functioning, (2) expansion of curriculum to include objectives, and (3) further development of test instruments and investigation of the P-M domain. (Author/RC)

Psycho-Motor Needs

ASSESSMENT OF VIRGINIA SCHOOL CHILDREN



FEDERAL PROGRAMS OFFICE
STATE DEPARTMENT OF EDUCATION
RICHMOND, VIRGINIA 23216
NOVEMBER, 1973

PSYCHO-MOTOR NEEDS ASSESSMENT OF VIRGINIA SCHOOL CHILDREN

Conducted and prepared by

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In cooperation with
The Virginia Department of Education
Task Force on Psycho-Motor Needs Assessment

May, 1973

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CHAPTER 1

INTRODUCTION TO THE PROJECT

The present study, the Psycho-Motor Needs Assessment of Virginia School Children, is a major effort to assess psycho-motor needs among Virginia school children. The study concentrated upon children in Kindergarten through grade four and in special primary classes for the educable mentally retarded. The study was made possible through Title III ESEA funds.

Early in 1971, the Virginia Department of Education appointed a task force to focus on the psycho-motor domain. This assignment fell on the heels of an intensive study to assess the cognitive and affective needs of Virginia school children, which had recently been completed.

The task force was comprised of a dozen persons from the State Department of Education. These persons were state supervisors and staff members representing special education, elementary education, secondary education (which includes health and physical education and vocational education), research and statistics, guidance and testing, and the office of Federal Programs. In the fall of 1971 an outside consultant was added to the task force.

The task force was immediately faced with a number of questions that were not easily answered, i.e. What is the psycho-motor domain? What measures are available to assess psycho-motor abilities? What, if any, are the needs of Virginia school children within this domain? What are the implications for curriculum and teacher education?

The Virginia Department of Education, through the task force, entered into an agreement with the N.C. Kephart Glen Haven Achievement Center to proceed with an assessment of psycho-motor needs among Virginia school children and to provide answers for the questions being raised.

The Kephart Center was responsible for all aspects of the study but worked closely with the task force in a cooperative venture. Members of the Virginia task force actively assisted in establishment of goals, the development and the implementation of the study. It was determined that this study would result in practical recommendations that would serve in the best interests of education in Virginia.

An outline of the study is contained in the proposal found in Appendix A. This proposal describes the nature of the project and the services to be provided by the Glen Haven Achievement Center.

The study would be concerned with defining the nature of the psycho-motor domain, and then the selection of appropriate assessment instruments. Related to this selection of assessment measures was the development of a screening instrument which could be utilized by classroom teachers in the identification of suspected deficiencies in psycho-motor functioning.

Following a pilot study to assess the adequacy of the instruments, data were collected from a state-wide stratified sample selected by the research department of the Virginia Department of Education.

Geographic and demographic variables suggested by the task force were used. The variables include: age, sex, race, socio-economic status

IQ, special class membership, population density, and geographic location.

Nearly complete information, including psycho-motor test data and screening information was obtained for 1371 children. This information was subjected to one way analysis of variance. The varibles: age, sex, race, socio-economic status, and population density, were further examined with a three way analysis of variance.

The screening measures were completed for an additional 1803 children. Data from the screening instrument and the primary psycho-motor test instrument (the Purdue Perceptual-Motor Survey) were subjected to further study using cluster analysis.

The Psycho-Motor Domain

Upon acceptance of the proposal by the Virginia task force, it was necessary to arrive at some agreement concerning the nature of the psycho-motor domain. It is possible to identify many components which may be included within this domain: sensory input, acuity of the sensory mechanisms, organization of this sensory information. The critical feature of the psycho-motor domain is the relationship of the preceding to motor or output activity.

The psycho-motor domain must be regarded as a complex integration of many functional processes. This integration results from and in the interaction of the individual with his environment. Kephart (Slow Learner in the Classroom, 2nd Edition) has pointed out that it is not possible to speak of input and output activity as though they were separated. The total activity of the individual, i.e. the relationship of incoming infor-

mation to the application of that information must be regarded. Only in this manner is the child able to organize himself in relationship to his environment and to monitor and organize this interaction within a time-space framework.

Cognition must be regarded as a super structure allowing for conscious identification and manipulation of relationships which were first established in the psycho-motor domain. Further elaboration of these cognitive aspects will depend upon how elaborate the psycho-motor domain has evolved as well as the elaboration of previous cognitive relationships. The performance of an individual will be influenced by the status of the psycho-motor domain. However, the relationships of the psycho-motor domain to function may vary widely from individual to individual.

The following examples might serve to illustrate the broad impact psycho-motor function can have upon performance. A child who has not experienced or perhaps is not aware of the positions of various objects in relationship to his own body may not have a basis for consistently labeling "over" and "under" and other words descriptive of spatial relations. Thus, a language problem based on inadequate psycho-motor learning exists.

A second child might perform a written task quite well if the teacher can patiently allow sufficient time. The composition of his written work may be quite accurate and perfectly legible, but the task is laboriously executed and the child may reasonably prefer to avoid the task or postpone its completion. Herein may lie a problem

of inefficiency of psycho-motor functioning, i.e. inability to rapidly translate visual input into motor output, rather than distortions in perception.

Another child may have difficulty remembering directions because he has not developed automatic movements and must give primary attention to the movements involved in carrying out the activity. If he begins to move before the directions are completed, he may not attend to, and therefore cannot process those directives presented after his initiated movement. Thus, that which initially appears to be a break down in cognition may be in reality, a psycho-motor interference that resulted in a lack of continuity in the integration processes.

Inherent in the definition of the psycho-motor domain are the processes of interaction between the individual and his environment. The effect of these interacting processes may be contrasted with effects of an environment upon an individual who is not adequately interacting. Interaction is dependent upon the individual's psycho-motor development.

CHAPTER 2

SELECTION AND DEVELOPMENT OF PSYCHO-MOTOR ASSESSMENT MEASURES

Because of the multi-dimensional nature of psycho-motor behavior it was not possible to assess performance in this area as an isolated entity. For the purpose of accomplishing an educational needs assessment in this domain it was necessary to select measurement tools that would permit an evaluation of the major component processes. With this in mind, a review of tests in use was conducted. A list of those instruments considered appear in Appendix B.

Selection of the Purdue Perceptual-Motor Survey

After a period of conscientious deliberation, the Purdue Perceptual-Motor Survey (PPMS) was selected as the instrument that would best measure the principal psycho-motor components.

The PPMS was authored by Eugene Roach and Newell C. Kephart in 1966. The purpose of the Survey was stated as follows:

> ...to provide the teacher with a tool which can be used to identify those children who do not possess perceptual -motor abilities necessary for acquiring academic skills by the usual instructional methods. (p.iii)

The PPMS is the product of several studies that subjected Kephart's Perceptual-Motor Survey (PMS) from the Slow Learner in the Classroom (1960) to a variety of statistical designs. The PMS was used for several years at the Achievement Center for Children, Purdue University, before being modified and published as the PPMS.

The collection of normative data for the PPMS was accomplished by Roach (1962). A discussion of the normative study may be found in Appendix B.

The PPMS published in 1966, was reviewed in Buros' seventh edition of the Mental Measurements Yearbook, Daniel Landis (1972, pp. 1282-1285). Portions of this review may also be found in Appendix B.

The authors of the PPMS, Roach and Kephart, originally considered five major component factors with twenty-two separate items that were grouped as follows:

(1) Balance and Posture
- Walking board - forward
- Walking board - backward
- Walking board - sidewise
- Jumping

(2) Body Image and Differentiation
- Identification of body parts
- Imitation of movement
- Obstacle course
- Kraus-Weber
- Angels-in-the-snow

(3) Perceptual-Motor Match
- Chalkboard - circle
- Chalkboard - double circle
- Chalkboard - lateral line
- Chalkboard - vertical line
- Rhythmic writing - rhythm
- Rhythmic writing - reproduction
- Rhythmic writing - orientation

(4) Ocular Control
- Ocular pursuit - both eyes
- Ocular pursuit - right eye
- Ocular pursuit - left eye
- Ocular pursuit - convergence

(5) Form Perception
- Visual achievement forms - form
- Visual achievement forms - organization

In 1972, Renate Neeman subjected the normative sample from Roach's study (1962) to Factor Analysis and produced an eight factor profile of the PPMS. The following list indicates which items of the PPMS were grouped according to Neeman's orthogonal rotated factors:

Factor I	Walking board - forward Walking board - backward Walking board - sidewise
Factor II	Chalkboard - circle Chalkboard - double circle Chalkboard - lateral line Chalkboard - vertical line
Factor III	Ocular pursuit - 12 items*
Factor IV	Jumping Identification of body parts Imitation of movement Angels-in-the-snow
Factor V	Rhythmic writing - rhythm Rhythmic writing - reproduction Rhythmic writing - orientation
Factor VI	Form perception - form Form perception - organization
Factor VII	Obstacle course
Factor VIII	Kraus-Weber

Neeman's study statistically substantiates what Kephart theoretically contended - that the PPMS was a measure of several components that may collectively be referred to as perceptual-motor behavior.

Available information indicates that the items of the PPMS have high construct validity, the instrument measures unique psycho-motor factors, and that among trained examiners, there is a high degree of reliability.

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*published version of PPMS consisted of four items

Selection of the Test of Non-Verbal Auditory Discrimination

While the PPMS was determined adequate for the assessment of psycho-motor abilities or processing in the areas of visual and motor functioning, the auditory component was not being included. The problem was increased since there is a notable lack of available auditory perceptual measures. It was also desirable to select a measure which complimented the concept of psycho-motor functioning, that is, the auditory percept would be closely related to an output response. Some of the auditory tests considered may be found in Appendix B.

Norman A. Buktenica (1968) has developed in the auditory area, the Test of Non-Verbal Auditory Discrimination (TENVAD), a measure of functional ability. Buktenica describes the test as follows:

> The TENVAD was constructed for the purpose of assessing auditory discrimination in young children and is patterened after the model of the Seashore Test of Musical Talent (1960). It is non-verbal and intended to provide an auditory discrimination test that is fairly stable across socio-economic and racial lines. TENVAD is made up of 50 pairs of tones in five subtests - Pitch Test, Loudness Test, Rhythm Test, Duration Test, and Timbre Test, each having ten pairs of tones. (TENVAD manual,1968)

The TENVAD was designed to be used for group testing but if the subjects being tested have difficulty following the examiners instructions, it may be administered individually with no completion time limit. (See Appendix B for more detailed description.)

By including the TENVAD in the psycho-motor assessment battery, all principal sensory and perceptual channels were accounted for.

Development of the Virginia Psycho-Motor Screening Instrument (Expermental Model)*

It would be desirable if classroom teachers had an instrument which they could easily administer for the purpose of identifying possible psycho-motor deficiencies. For the purpose of developing such an instrument, members of the Glen Haven Achievement Center considered a number of behaviors manifested by children in the classroom that would appear to be indicative of psycho-motor problems. There was an attempt to identify behaviors which might reflect data obtained from the PPMS and the TENVAD, although it was anticipated that the effects of numerous other factors and interactions would be involved in the classroom behavior.

A listing of these behaviors was made and presented to a group of classroom teachers for the purpose of assuring intelligibility and accuracy in interpretation. Based upon the corrective criticism offered by the classroom teachers, several of the behavior items were re-worded.

At this point, the first draft of the Checklist was printed. The Checklist consisted of 54 behavior items written in a negative form, ie. the behaviors described by the items were inappropriate and indicative of deficits in the psycho-motor domain.

The Checklist was designed to be used by classroom teachers who would respond to the items by placing a check (✓) in a plus (+) column, indicating that the student in question did manifest the behavior described by the item, or placing a check in a minus (-) column, if the student did not perform similar to the described behavior. The option of

*referred to as Checklist

checking a zero (0) column was provided in the event the teacher could not recall how the student performed specific to the described behavior or in the event she had not had an opportunity to observe certain behaviors.

Pilot Projects

Upon the selection of the test measures and the development of the Virginia Psycho-Motor Screening Instrument, it was desirable that some field data be obtained. A cooperating school in Colorado enabled staff members of the Glen Haven Achievement Center to assess a total of forty children from grades 1 and 2, and from four different classes. The participating teachers were asked to select approximately an equal number of students from the upper and the lower halves of the classes.

The teachers were then asked to complete a Checklist for each child. Since the school conducted an open program, most of the teachers had an opportunity of observing the majority of the forty children selected. By examining the responses of four teachers scoring the same child, it appeared that a fair degree of agreement was being achieved, although total scores varied. The teachers also made suggestions for improving the wording of various items and in the instructions. With these changes an Experimental Edition of the Virginia Psycho-Motor Screening Instrument was printed. (See Appendix D.)

A pilot project was undertaken in Virginia by the staff of the Glen Haven Achievement Center utilizing the assessment measures including the revised Checklist. This pilot study would determine further, the adequacy

of the instruments. The children came from six classes; Special Education, Kindergarten, and grades one through four; and from six schools across the state located in Radford, Cave Springs, Hopewell, King William, Fairfax, and Richmond City. Approximately 180 children were evaluated and teacher Checklists obtained.

Evaluation of the pilot study data indicated the following:

(1) Fair agreement between the composite scores on the PPMS and scores obtained on the Checklist.

(2) Approximately six items on the Checklist appeared to be yielding no useful information. Rather than remove these items, however, it was decided to leave them and obtain more data from the larger sample.

(3) The TENVAD would require individual testing in some cases or in groups of no more than five among the Special Education, Kindergarten and first grade classes. The administration of the TENVAD and the management of the child in these classes would be difficult for examiners with limited training.

(4) Because of the anticipated problem in the collection of TENVAD data and the limited time examiners would have in a particular school the examiners were asked to give priority to the group testing of second, third and fourth graders. Where possible there was an attempt to gain the assistance of speech and hearing personnel in the testing of Special Education, Kindergarten and first grade children.

CHAPTER 3

COLLECTION OF DATA

The testing of an anticipated 1500 school children from 169 classes located in 76 schools throughout the state proved to be a major undertaking in itself. This testing did not include the distribution and retrieval of the teacher Checklist (Virginia Psycho-Motor Screening Instrument) for the 1500 children and an anticipated 3000 additional children who would be measured on the Checklist alone, as the Checklist was distributed and retrieved by mail.

The Research Division of the Virginia Department of Education provided the Glen Haven Achievement Center with the list of schools and respective grades that would be involved in the study. The schools and grades selected were to have appropriately represented the proportion of identifiable groups within the state. These groups included the six geographic areas of the state: Southwest, Valley, Northern, Southside, Central and Tidewater; three population designations: urban, suburban, rural; and three socio-economic levels as measured by children who received a free lunch, partially paid for their lunch, or entirely paid for their own lunch.

The pilot project that had been conducted proved most valuable in anticipating the problems that would be encountered in the data collection process. The geographic regions would present the largest problem because of the distance between schools and the mountainous

region in the western part of the state.

It was necessary to locate and select individuals to do the testing. Graduate students and housewives were considered. While housewives might find it easier to arrange a daily schedule that would permit testing, the Graduate students were chosen because of the training experience that would be provided and the interest that might be generated among Virginia colleges.

The task force contacted representatives on the campuses of the Virginia colleges and universities to inform them of the project, who in turn contacted Graduate students, primarily from education, psychology, and child development. If the students were interested and able to participate, they contacted the Glen Haven Achievement Center. Letters describing the requirements were then sent to the students (refer to Appendix C). Not all students were able to meet the requirements, which included the provision of their own transportation, attendance at a training session from two to three full days and a schedule that would permit approximately ten days of testing over a three week period.

Since an examiner could administer ten Purdue Perceptual-Motor Surveys and one or two group administrations of the TENVAD per day, fifteen examiners could, in ten days test the anticipated 1500 children. It was also determined that fewer examiners would permit greater scoring reliability.

A cumbersome formula was devised for providing travel allowances,

lodging expenses plus fees for each day of testing with a minimum number of tests to be completed. The students were also reimbursed for their participation in the training session. This manner of payment was discarded in favor of a straight forward manner of payment of $44.00 per class tested. In addition to the money, the student examiners were offered two graduate credits in a practicum entitled, "Psycho-Motor Assessment".

Prior to the trainings sessions the students were mailed copies of the Purdue Perceptual-Motor Survey and asked to become familiar with the administration and scoring procedures. Since the Purdue Perceptual-Motor Survey was the primary instrument of measurement and each student would be required to attain a level of proficiency, it was desirable that the field worker or examiner have as much of the "book work" as possible out of the way prior to the training sessions.

Two training sessions were conducted, one in Petersburg and the other in Bristol. The first of these sessions began with thirteen participants. Two of these persons did not continue in the project after the first day of training. The total of three days and two evenings comprised the training of the first group of eleven. The second training session had five participants and lasted two days.

The training sessions were concerned with five specific objectives:

(1) To familiarize the examiners with all testing instruments

being used (the PPMS and the TENVAD).

(2) To develop examiner's skills in testing and assure standards of reliability among all examiners.

(3) To acquaint workers with procedures in working with school personnel, for leaving forms which were to be completed by school personnel, for random selection of children, and for returning data.

(4) To assign schools and classes in the sample to field workers.

(5) To resolve any problems in logistics, i.e. travel, supplies, conflicting schedules of workers, etc.

The training sessions were conducted in schools, the Blanford school in Petersburg and the Wallace school near Bristol. By holding the training sessions in the schools, it was possible to have an unlimited number of children with whom our examiners might work. Sessions began by asking the students to collectively score tests administered by the instructors who were members of the Glen Haven Achievement Center. Students were then asked to administer the Purdue Perceptual-Motor Survey in pairs, taking turns at scoring and administration. The testing was done in close proximity so that when examples meriting attention were observed, the entire group could share in the experience. In all cases each student had an opportunity to work with all age levels.

Evaluation of the student's performance was made by having

all examiners independently score the responses of a single child; this was repeated with no less than four children. Agreement between scores could be judged as well as further discussion concerning scoring problems. In general, it was expected that the examiners would come within $\pm$ 3 points of their average total scores.

The students were also given opportunities to observe the administration of the TENVAD. The administration of this instrument was limited only to grades 2, 3 and 4 by the present field personnel. Whenever possible speech and hearing personnel administered the TENVAD individually or in small groups of three to five, to Kindergarten and first grade children.

Every effort was made to help the field personnel to identify with the project. This was achieved by sharing as much background information regarding the project as time permitted and allowing them every opportunity possible to combine their efforts and achieve the necessary results as efficiently as possible.

The students were each provided with a map of the state, locating each school in the sample. They were also provided with lists naming the grades to be tested in each school, the address of the school, the phone number and the principal. Any special notations regarding dates closed for holidays were also noted, if known. Given the assignments, i.e. to test ten children in each class within the following four week period, the students collectively divided the classrooms among themselves. At the completion of this

step, a duplicate list was prepared for each examiner and the Glen Haven Achievement Center which identified specifically those classes for which the individual examiner would be responsible.

Examiners were asked to phone or write to the principals to inform them of the time of their visit. Should the examiner not be able to meet the schedule, he was instructed to phone the principal and set another time. Letters to the principals from the Glen Haven Achievement Center preceded the examiner. These letters introduced the project and informed the principal of what to expect. (Refer to Appendix C.)

Upon arriving at the school, the examiners introduced themselves and obtained an alphabetical list of the students in the class to be tested. By using a random number technique, the examiner selected ten children to be tested. If a school had more than one class for a particular grade, the examiner was instructed to ask the principal to select the most heterogeneous class. The examiners were asked to select substitutes for children who had known obvious physical defects, such as limited and uncorrected deficits in visual or auditory acuity, and crippled motor ability.

The Special Education classes included in the study were primary classes for educable retarded. However, and not unexpectedly, the children enrolled in these classes represented a wide range of problems and ages. It also became apparent that a number of "special education" children were being integrated into regular classrooms. It was decided that the examiners would let the random selection procedure remain in effect with respect to these children. Specifically, if a child enrolled

in a regular classroom was randomly selected, he would be left in the sample even though he might be a candidate for a special education class, provided the child had no physical handicap.

The field examiners were responsible for seeing that the necessary equipment, i.e. walking board, paper and tape recorder, etc. would be present. The examiners carried their own test forms.

The Independent Variable Summary Sheet when completed would supply pertinent identifying data to be used in the study. (See Appendix D.) It was therefore, necessary to instruct the field examiners with regard to its completion. Upon the selection of the ten children from a class, the examiners entered the ten names on the Summary Sheet and school personnel would complete the form and return it to the Glen Haven Achievement Center in a post-paid envelope.

The Virginia Psycho-Motor Screening Instruments were sent by mail to the principals with a letter from the Glen Haven Achievement Center explaining their use. (See Appendix C). Thirty-four were sent for each classroom from which came a sample of ten children who were administered the PPMS and the TENVAD. The teacher was asked to complete a Checklist for each of those ten children and also for each of the remaining children in her classroom. These Checklists were then returned to the Glen Haven Achievement Center in post-paid envelopes.

CHAPTER 4

METHOD OF ANALYSIS

Upon the return of the specified information described in Chapter 3, analysis of the data was begun by various methods.

Tables representing the distribution of all children tested are found in Chapter 5. Those children for whom only Checklists were returned are not included in this distribution.

Cluster analyses of the PPMS and the Checklist were completed and the results are described in Chapter 6. These analyses were made by using the statistical procedure developed by R. C. Tryon and D. E. Bailey.*

Three separate cluster analyses were performed. The first cluster analysis involved the data from the PPMS. The second cluster analysis involved the Checklist responses of those same subjects who were administered the PPMS. The third cluster analysis involved the additional Checklists returned by the classroom teachers (no PPMS having been given to this group) and comparison was then made with the cluster analysis of the original group of Checklist clusters.

Basically, the procedure provides a means of determing which items of a test are closely related, i.e. which items are measuring the same

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*The Computer program utilized is available from the University of Colorado Computer Center and is based on Tryon, R.C. and Bailey, D.E. Cluster Analysis, McGraw-Hill, New York, 1970.

types of behavior.

When resulting test data is submitted to a cluster analysis procedure, a profile of the test is derived. This profile reveals the degree of relationship each question or item has to each other question or item on the test. Questions and items that are closely related are grouped or clustered together. The more closely they are related, the higher will be their respective coefficients within their cluster. Usually, items that have a low coefficient of relationship to the clusters in which they appear are eliminated from the test. Some of the items will appear in more than one cluster; if an item has a high coefficient of relationship to all the clusters, it appears to the interpreter that the question is measuring more than one aspect of behavior.

Upon the identification of different clusters within each of the two tests (PPMS and Checklist), it was possible to assume that the items within each cluster were essentially measuring the same factor. With this assumption in mind, the response distribution of every cluster of the PPMS and the Checklist for every individual was examined by a scoring process known as Convergence Analysis (Hoffmeister, 1968). When employing this process it is assumed that the majority of an individual's responses will communicate the same information and a test score is then given based upon these responses which are grouped closely together on the response scale.

If a person's responses do not group together, no test score is computed for that test. It is assumed that more testing and/or personal questioning is required before conclusions can be made about the mean-

ing of such distributions.

The following are response distribution possibilities:

Example A	X	X			X	X	not scored
Example B	X			X	X	X	not scored
Example C	X		X		X	X	not scored
Example D				X	X	X	X scored

In Examples A and B, the responses do not cluster at either end of the response scale, resulting in a bimodal or skewed distribution. In Example C, the responses are distributed approximately equally across all possible scale response categories, consequently exhibiting a flat distribution and therefore, is not scored. Example D would be scored as the responses are clustered together on the response scale, and essentially consistent information is communicated.

The Convergence Analysis procedure rejects or does not calculate any questionable response distributions, and these rejected distributic of the PPMS and Checklist clusters are not included in any future statistical analysis which involves those clusters. The result of this procedure is to give more significant meaning to the final score and subsequent conclusions.

This process also offers a valuable aid to individual analysis and further investigation, in that it permits immediate focus on possil problems for any single individual.

Frequency distributions of total scores on the PPMS and the TENVAD were obtained. The PPMS was further evaluated by grade and by cluster, and the results are described in Chapter 6.

Correlations between the PPMS, the Checklist and TENVAD scores were obtained and are also described in Chapter 6. The TENVAD analysis, however, was based upon limited data coming primarily from second, third, and fourth grades.

Since a primary interest of the study was to assess needs among the general population, it was decided to gather additional information concerning the distribution of the PPMS and Checklist clusters excluding the Special Education sample. The reason for the exclusion was based on the fact that approximately twenty per cent of the total sample was identified as being in Special Education and assumed to fall within the range of intellectual retardation. This percentage was far in excess of what is expected in the general population.

Therefore, distribution of PPMS and Checklist clusters based on pass-fail criteria for the respective clusters was obtained for the sample, excluding students enrolled in Special Education classes.

The data were further subjected to analyses of variance and the results are discussed in Chapter 7. This analysis again was based on the total sample minus the children enrolled in Special Education classes.

Analysis of variance is a statistical procedure used to test the differences between the effect of certain variables upon different samples. In this portion of the study, the effect such variables as chronological age, intelligence quotient, TENVAD total score, PPMS composite score, and

Checklist cluster score, had on such independent variables as grade level, socio-economic status, sex, race, rural-suburban-urban status, and geographic region, was of interest.

Whenever enough subjects were present, three-way analysis of variance was obtained for the variables: age, sex, race and population density with respect to the clusters of the PPMS and the Checklist.

Frequencies, correlations and analyses of variance were obtained from programs included in the Test Analysis Reporting Package (TARP) by the Test Analysis and Development Corporation, Boulder, Colorado.

CHAPTER 5

SOURCE OF DATA: FREQUENCY DISTRIBUTION OF INDEPENDENT VARIABLES*

The Research Division of the Virginia State Department of Education provided a list of schools and classes from which the subjects who participated in this project were randomly selected.

According to the lists provided, the total number of schools available for participation was 76 and the total number of classes was 169.

As described in Chapter 3, the PPMS and the TENVAD were administered by trained examiners who forwarded the results to the Glen Haven Achievement Center. The Summary Sheet, which provided necessary data regarding sex, race, etc. of the child tested, and the Checklist were to be completed and returned by school personnel and teachers. The classroom teacher was provided enough Checklists for an entire class and was asked to fill out one form on each of the selected subjects. Checklists on the other students in the class were also requested.

Since 169 classes were selected for participation in the project, the maximum number of subjects anticipated was 1690 (10 subjects per class). It was also anticipated that a maximum of another 2600 Summary Sheets would be available for additional cluster analysis.

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* The data in Chapter 5 represent the total sample. Similar tables excluding the Special Education sample may be found in Appendix E.

Frequency Distribution: Virginia Schools

Table 1 indicates the distribution of subjects according to geographic region, for whom appropriate data (test data, identifying information, and checklists - with most of the information requested available) were received. As is indicated, data was received for 1371 subjects. It should be noted that data on 221 subjects collected by the Glen Haven Achievement Center staff in the Pilot Study Phase of the project and the training sessions was included.

Much credit is given to the Virginia classroom teachers who participated in this project. Accurate data received on 1371 out of a possible 1690 represents an eighty-one per cent return which may be considered very good for any research project which requires a

TABLE 1

FREQUENCY DISTRIBUTION: VIRGINIA SCHOOLS BY GEOGRAPHIC REGION

Geographic Region	Number Of Schools	Subject Frequency	Percent Of Total
Region 1 Southwest	11	248	18.09
Region 2 Valley	10	218	15.90
Region 3 Northern	8	206	15.03
Region 4 Southside	16	209	15.24
Region 5 Central	17	290	21.15
Region 6 Tidewater	14	200	14.59
Total	76	1371	100.00

Note -- For Further information on individual schools, see Tables 2-7.

"mail-in" data accummulative procedure. Additional Checklists were returned for 1803 children.

Tables 2 - 7 indicate the frequency of subjects and the classes designated for participation by school within each geographic region.

Table 2

FREQUENCY DISTRIBUTION: VIRGINIA SCHOOLS - SOUTHWEST REGION

Schools	Code Number	Subject Frequency	Grades
Highland View Elementary	01	30	K, 3, 4
Kuhn Barnett Elementary	02	40	K, 2, 4, Sp.Ed.
Clinchco Elementary	03	24	1, 3, Sp.Ed.
Floyd Elementary	04	0*	2, 4, Sp.Ed.
Baywood Elementary	05	29	1, 3, 4
Gilbert Linkous Elementary	06	29	1, 2, 3
Christiansburg Elementary	07	0*	Sp.Ed.
Cedar Bluff Elementary	08	30	K, 1, 2
Richlands Elementary	09	9	Sp.Ed.
Wallace Elementary	10	28	K, 2, 4
Austinville Elementary	11	29	K, 1, 3
	Total	248	

* Denotes those schools from which no data was received or data which was inaccurate.

Table 3

FREQUENCY DISTRIBUTION: VIRGINIA SCHOOLS - VALLEY REGION

Schools	Code Number	Subject Frequency	Grades
Parry McCluer Elementary	12	29	K,2,3
Harrington Waddell Elementary	13	39	K,2,4,Sp.Ed.
Belmont Elementary	14	38	K,1,3,Sp.Ed.
Virginia Avenue Elementary	15	0*	1,4,Sp.Ed.
Eagle Rock Elementary	16	20	1,3
Boyce Elementary	17	0*	K,2,4
Middletown Elementary	18	29	1,3,Sp.Ed.
Monterey Elementary	19	20	2,4
Cave Spring Elementary	20	33	K,1,3,4
E. Wilson Morrison Elementary	21	10	2,Sp.Ed.
	Total	218	

* Denotes those schools from which no data was received or data which was inaccurate.

Table 4

FREQUENCY DISTRIBUTION: VIRGINIA SCHOOLS - NORTHERN REGION

Schools	Code Number	Subject Frequency	Grades
Patrick Henry Elementary	22	38	K,1,2,3,4
R. E. Lee Elementary	23	10	Sp.Ed.
Madison Elementary	24	49	K,1,2,3,4
Lemon Road Elementary	25	39	K,1,2,3,4
Timber Lane Elementary	26	10	Sp.Ed.
Lincoln Elementary	27	40	1,2,3,4
Douglass Elementary	28	10	Sp.Ed.
Cameron Elementary	29	10	2
		Total 206	

Table 5

FREQUENCY DISTRIBUTION: VIRGINIA SCHOOLS - SOUTHSIDE REGION

Schools	Code Number	Subject Frequency	Grades
Patrick Copelend Elementary	30	20	1,3
R. E. Lee Elementary	31	0*	1
Blanford Elementary	32	0*	4,Sp.Ed.
McKenney Elementary	33	20	3,4
Dinwiddie Elementary	34	10	Sp.Ed.
Callaway Elementary	35	0*	2,3
Irisburg Elementary	36	30	K,1,2
Axton Elementary	37	0*	Sp.Ed.
West End Elementary	38	20	1,3
Meadows of Dan Elementary	39	20	2,4
Worsham Elementary	40	30	K,1,4
Prince Edward Elementary	41	10	Sp.Ed.
South Elementary	42	20	2,3
William A. Walton Elementary	43	10	Sp.Ed.
Surry Elementary	44	10	4
Luther P. Jackson Elementary	45	9	2
	Total	209	

* Denotes those schools from which no data was received or data which was inaccurate.

Table 6

FREQUENCY DISTRIBUTION: VIRGINIA SCHOOLS - CENTRAL REGION

Schools	Code Number	Subject Frequency	Grades
Venable Elementary	46	19	K,2
Lakeview Elementary	47	30	3,4,Sp.Ed.
Hugh Mercer Elementary	48	20	K,Sp.Ed.
Ginter Park Elementary	49	20	K,2
Woodville Elementary	50	13	Sp.Ed.
Boonsboro Elementary	51	20	1,3
Yellow Branch Elementary	52	20	2,4
Ladysmith Elementary	53	20	3,4
A. M. Davis Elementary	54	19	K,2
Columbia District Elementary	55	10	1
Central Elementary	56	5	4
Greene County Elementary	57	0*	3
William Monroe Elementary	58	9	4
King George Elementary	59	29	K,2,Sp.Ed.
Rappahannock Elementary	60	20	1,Sp.Ed.
R. E. Lee Elementary	61	19	1,3
Stafford Elementary	62	17	1,Sp.Ed.
	Total	290	

* Denotes those schools from which no data was received or data which was inaccurate.

Table 7

FREQUENCY DISTRIBUTION: VIRGINIA SCHOOLS - TIDEWATER REGION

Schools	Code Number	Subject Frequency	Grades
Southwestern Elementary	63	30	2,3,Sp.Ed.
Willis A. Jenkins Elementary	64	19	2,4
Denbigh Elementary	65	10	Sp.Ed.
Ocean View Elementary	66	0*	K,1,2,3
John Randolph Elementary	67	5	1
Andrew J. Brown Elementary	68	20	2,Sp.Ed.
Thomas Jefferson Elementary	69	10	4
Hamilton Holmes Elementary	70	10	4,Sp.Ed.
Lee Jackson Elementary	71	0*	1,4
Wilton Elementary	72	20	1,3
Machipongo Elementary	73	19	2,3
Washington District Elementary	74	10	2
Oak Grove Elementary	75	10	4
Yorktown Elementary	76	37	K,1,3,Sp.Ed.
		Total 200	

* Denotes those schools from which no data was received or data which was inaccurate.

Frequency Distribution: Grade Level

Table 8 indicates the number of subjects for whom appropriate data was received by grade level. A percentage that reflects a correspondence between the frequency count per level and the maximum possible count per level is listed as follows (eg. 22 Kindergarten classes designated to participate, therefore data on a possible 220 subjects should have been received but accurate data on only 170 was returned or 77 per cent): Kindergarten - 77%, 1st - 80%, 2nd - 84%, 3rd - 88%, 4th - 80%, and Special Education - 72%.

Table 8

FREQUENCY DISTRIBUTION: GRADE LEVEL

Grade Level	Subject Frequency	Percent Of Total
Kindergarten	170	12.40
1st Grade	238	17.36
2nd Grade	262	19.11
3rd Grade	258	18.82
4th Grade	232	16.92
Special Education	211	15.39
Total	1371	100.00

Frequency Distribution: Age Level

Table 9 indicates the distribution of chronological age for all subjects for whom data was received. The incidence of subjects with chronological ages as high as 17 years is accounted for by the participation of subjects from the Special Education - Educable Mentally Retarded classes.

Table 9

FREQUENCY DISTRIBUTION: AGE LEVEL

Age Level (Years)	Subject Frequency	Percent Of Total
No Data Recorded*	16	
6 - 6-11	128	9.45
7 - 7-11	194	14.32
8 - 8-11	265	19.56
9 - 9-11	276	20.37
10 - 10-11	285	21.03
11 - 11-11	119	8.78
12 - 12-11	56	4.13
13 - 13-11	17	1.25
14 - 14-11	8	.59
15 - 15-11	5	.37
16 - 16-11	1	.07
17 - 17-11	1	.07
Total	1355	100.00

* Number of subjects for whom age level could not be determined.

Frequency Distribution: Intelligence Quotient Level

Table 10 indicates statistical information pretaining to the distribution of IQ scores in the sample population. Note that no IQ scores were available for 39 per cent of the total sample numbering 1371. In Kindergarten and first grade, IQ scores were generally not available.

Table 10

FREQUENCY DISTRIBUTION: INTELLIGENCE QUOTIENT LEVEL

IQ Level	Subject Frequency	Percent Of Total	
No Data Recorded*	544		Mean 92.52
20 - 29	1	.12	Variance 397.22
30 - 39	4	.48	
40 - 49	13	1.57	Standard Deviation 19.93
50 - 59	37	4.47	
60 - 69	60	7.26	Standard Error .69
70 - 79	93	11.25	
80 - 89	122	14.75	Low Score 26.00
90 - 99	175	21.16	
100 - 109	160	19.35	High Score 147.00
110 - 119	104	12.58	
120 - 129	40	4.84	Range 121.00
130 - 139	16	1.93	
140 - 149	2	.24	
Total	827	100.00	

* Number of subjects for whom IQ scores were not available.

The mean value of 92.52 should not be interpreted to suggest that the average IQ of Virginia school children (K-4) corresponds with that figure. Included in data used to compute the mean were IQ scores from 170 subjects from the Special Education classes who by definition attain low scores.

Frequency Distribution: Socio-Economic Status (Lunch Status)

Table 11 indicates the distribution of subjects for whom data were received regarding their lunch status. For the purpose of this study, lunch status was deemed to be the most appropriate method of ascertaining the socio-economic status for this sample of the Virginiaschool population. Of those children who ate lunch at school, lunch status was assigned on the basis of whether or not the family paid for the child's lunch.

Table 11

FREQUENCY DISTRIBTION: SOCIO-ECONOMIC STATUS (LUNCH STATUS)

Lunch Status	Subject Frequency	Percent Of Total
No Data Recorded*	471	
Child Receives Free Lunch	257	28.56
Child Partially Pays	22	2.44
Child Pays Total	621	69.00
Total	900	100.00

*Number of subjects for whom information was not available.

Another more sophisticated method was attempted, the Hollingshead Two-Factor Index of Social Position. This method requires the collection of information pretaining to the subjects' parents, specifically the highest level of formal education achieved by the head of the household and the vocational classification of the head of the household. Data of this nature were received for only a small percentage (17%) of the sample population and therefore could not be used for the purpose of developing inferences to the Virginia school population, or to support the use of lunch status as a substitute for socio-economic status.

Frequency Distribution: Sex

Table 12 indicates the distribution of males and females within the sample population.

Table 12

FREQUENCY DISTRIBUTION: SEX

Sex	Subject Frequency	Percent Of Total
No Data Recorded*	11	
Male	712	52.35
Female	648	47.65
Total	1360	100.00

*Number of subjects for whom information was not available.

Frequency Distribution: Race

Table 13 indicates the race distribution within the project sample.

Table 13

FREQUENCY DISTRIBUTION: RACE

Race	Subject Frequency	Percent Of Total
White	931	67.91
Black	435	31.73
Other	5	.36
Total	1371	100.00

Frequency Distribution: Rural-Suburban-Urban Status

Table 14 indicates the distribution of subjects according to the rural-suburban-urban status classification. The status information for each participating school was provided by the Division of Research, Virginia Department of Education. The status of each child was determined by the school attended.

Table 14

FREQUENCY DISTRIBUTION: RURAL-SUBURBAN-URBAN STATUS

Rural-Suburban-Urban Status	Subject Frequency	Percent Of Total
No Data Recorded*	31	
Rural	635	47.39
Suburban	547	40.82
Urban	158	11.79
Total	1340	100.00

*Number of subjects for whom information was not available.

CHAPTER 6

ANALYSIS OF THE PSYCHO-MOTOR INSTRUMENTS AND DISTRIBUTION FREQUENCIES

Purdue Perceptual-Motor Survey

In the course of data analyses for the present study the PPMS was subjected to the Cluster Analysis Procedure (Tryon and Bailey) using 1371 subjects from grades, Kindergarten through four, plus children enrolled in Special Education classes. Refer to Chapter 4 for a discussion of cluster analysis. The following list represents the oblique unifactor structures generated as a product of this statistical procedure and the items included in those clusters. Also included are the corresponding coefficients of inter-correlation.

Clusters	Items	Coefficient
I	Ocular pursuit - left eye	.88
	Ocular pursuit - right eye	.86
	Ocular pursuit - both eyes	.86
	Ocular pursuit - convergence	.58
III	Walking board - backward	.77
	Walking board - sidewise	.71
	Walking board - forward	.58
IV	Chalkboard - double circle	.64
	Chalkboard - circle	.63
	Chalkboard - vertical line	.60
	Chalkboard - lateral line	.45
II	Rhythmic writing - orientation	.83
	Rhythmic writing - reproduction	.77
	Rhythmic writing - rhythm	.75
V	Visual achievement - form	.55
	Visual achievement - organization	.54
VI	Jumping	.66
	Angels-in-the-snow	.59
	Imitation of movement	.54
	Identification of body parts	.52
VII	Obstacle course	
VIII	Kraus-weber	

Notice that the factors from Neeman's study (Chapter 2) using Roach's normative sample and the clusters from the present study using the extensive sample of the Virginia school population, are identical.

The identical replication of Neeman's factors using a different statistical procedure and a different sample of subjects, conclusively supports the multi-component characteristic of the PPMS as a comprehensive measure of perceptual-motor behavior and psycho-motor performance.

Table 137 in Appendix E presents a correlation matrix of the PPMS clusters and Table136 lists the correlations of each item on the PPMS with each of the clusters.

For the purpose of this study and for future use of the PPMS, the areas measured by the PPMS as component parts of the construct psychomotor are defined as follows:

Cluster I	OCULAR CONTROL Ocular pursuit items consisting of monocular and binocular coordination of eye muscles in pursuit and convergence tasks, coordination of eyes with the visual target, ability to maintain these controlled relationships between eye and target
Cluster II	RHYTHMIC WRITING Rhythmic writing items involving directional translation of arm movements from visual images, visual figure-ground relationships, movement fluency, continuity of the perceptual-motor match
Cluster III	BALANCE Walking board items involving postural flexibility, coordination of the two sides of the body in relationship to gravity, coordination of upper and lower body, matching body orientation to a visual-spatial structure

Cluster IV	VISUAL MOTOR CONTROL
	Chalkboard items (excluding rhythmic writing) requiring laterality and the interaction between the two sides of the body, fluency and ease of movement, visual-motor relationships in spatial planning, and crossing body midline
Cluster V	FORM PERCEPTION
	Visual achievement items requiring visual perception, visual to motor translation, continuity and organization of reproduction, visual figure-ground relationships, planning and anticipation of spatial requirements
Cluster VI	DIFFERENTIATION
	The four items - jumping, angels-in-the-snow, imitation of movement, identification of body parts which involve differentiation of body parts, translation and coordination of body movements from visual or auditorily presented patterns, synchrony of response
Cluster VII	OBSTACLE COURSE
	Obstacle course items requiring judgement of space in relationship to body and movement
Cluster VIII	KRAUS-WEBER
	Kraus-Weber items requiring the differentiation of upper and lower halves of the body, ability to sustain work of identified muscle groups

Having identified and defined the clusters into which the items of the PPMS appeared, it was now possible to determine the deficit areas within the psycho-motor domain by evaluating the response performance of the 1371 subjects for whom Perceptual-Motor Surveys were available.

According to the scoring criteria of the PPMS, one of four alternative scores were assigned to a subject's performance on an individual

item by the examiner. They are explained as follows:

Score 4	Assigned if the child performs the task accurately and easily
Score 3	Assigned if the child performs the task accurately but has minor difficulties
Score 2	Assigned if the child performs the task with extreme difficulty
Score 1	Assigned if the child is unable to perform the task

Each subject was assigned a score of 4, 3, 2, or 1 on each of the twenty-two items of the PPMS. Scoring standards of the PPMS are such that scores of 1 and 2 are regarded as failing scores for a particular item, and scores of 3 and 4 are regarded as passing scores. A frequency distribution of PPMS composite scores appears in Table 15. The composite score corresponds to the average score, thus, the range of scores was from 1.00 to 4.00 and reflects the total score divided by the number of items administered. This distribution included all children in the sample who were administered the PPMS, including those enrolled in Special Education classes.

A composite score of 2.49 or less was regarded as a deficit performance. Since a score of 2.50 represented the very minimum of a passing score and the very maximum of a failing score, 2.49 was chosen as the cut-off score.

Table 15

FREQUENCY DISTRIBUTION: PPMS COMPOSITE SCORE

Composite Score	Subject Frequency	Percent Of Total	Cumulative Frequency
No Data Recorded*	74		
1.00 - 1.24	34	2.62	34
1.25 - 1.49	9	.69	43
1.50 - 1.74	20	1.54	63
1.75 - 1.99	30	2.31	93
2.00 - 2.24	68	5.24	161
2.25 - 2.49	62	4.78	223
2.50 - 2.74	133	10.25	356
2.75 - 2.99	241	18.58	597
3.00 - 3.24	257	19.81	854
3.25 - 3.49	185	14.26	1039
3.50 - 3.74	138	10.64	1177
3.75 - 3.99	10	.77	1187
4.00	110	8.48	1297
Total	1297	100.00	

Mean	Variance	Standard Deviation	Standard Error
2.97	.41	.64	.02

Note.-- The Composite Score per subject is the Average Score for that subject, eg. S1 Total Score = 75, PPMS has 22 items, 75/22 = 3.80 Average Score.

* If all items were not scored, subject's Composite Score was deleted from the sample.

A similar distribution appears in Table 16 but excluding children enrolled in Special Education classes. This table indicates the number and percentage of children in Kindergarten through grade four who received composite scores above and below 2.49.

Table 16

FREQUENCY DISTRIBUTION ON SAMPLE EXCLUDING SPECIAL EDUCATION: PPMS COMPOSITE SCORE

Composite Score	Subject Frequency	Percent Of Total
No Data Recorded*	57	
1.00 - 2.49	129	11.70
2.50 - 3.99	871	78.97
4.00	103	9.34
Total	1103	100.00

Mean	Variance	Standard Deviation	Standard Error
3.07	.32	.56	.02

*If all items were not scored, subject's composite score was deleted from the sample.

Using a criteria point of 2.49, a total of 11.7% of the children in Kindergarten through grade four received deficit scores on the entire PPMS.

For the purpose of this study, it was considered essential that

the subjects be evaluated in terms of the component areas of psychomotor behavior, therefore, the scores on clusters of items was needed. Since some clusters had more items than others it was not appropriate for comparative purposes to use total item scores per cluster, but rather an average of the items within a cluster. However, even averages of items within a single cluster may hide important data. Therefore, in order to represent the data in as conservative manner as possible and to gather more information about individual differences and the PPMS clusters themselves, Convergence Analysis was also undertaken. Refer to the discussion of Convergence Analysis in Chapter 4.

Any cluster that had two or more items scored was examined in order to determine if the items within the cluster were grouped together and yielding consistent data. If the item scores were spread, resulting in a questionable distribution, the scores were not averaged and the subject's score for that cluster was eliminated from the analysis. The range of cluster scores was from 1.00 to 4.00.

Tables 17 through 24 indicate the percentage of children in the total sample, excluding children enrolled in Special Education classes, who exhibit deficits in each of the PPMS clusters, ie. scores at or below 2.49. The number of subjects that appear in the heading "No Data Recorded" represent the number of questionable distributions within the designated cluster.

Table 17

FREQUENCY DISTRIBUTION: PPMS CLUSTER I - OCULAR CONTROL

Cluster Score	Subject Frequency	Percent Of Total
No Data Recorded*	8	
1.00 - 2.49	273	23.70
2.50 - 3.99	691	59.98
4.00	188	16.32
Total	1152	100.00

Mean	Variance	Standard Deviation	Standard Error
2.90	.60	.77	.02

*Questionable distributions

Table 18

FREQUENCY DISTRIBUTION: PPMS CLUSTER II - RHYTHMIC WRITING

Cluster Score	Subject Frequency	Percent of Total
No Data Recorded*	6	
1.00 - 2.49	265	22.96
2.50 - 3.99	782	67.76
4.00	107	9.27
Total	1154	100.00

Mean	Variance	Standard Deviation	Standard Error
2.92	.43	.65	.02

*Questionable distributions

Table 19

FREQUENCY DISTRIBUTION: PPMS CLUSTER III - BALANCE

Cluster Score	Subject Frequency	Percent of Total
No Data Recorded*	26	
1.00 - 2.49	87	7.67
2.50 - 3.99	827	72.93
4.00	220	19.40
Total	1134	100.00

Mean	Variance	Standard Deviation	Standard Error
3.29	.30	.35	.02

*Questionable distributions

Table 20

FREQUENCY DISTRIBUTION: PPMS CLUSTER IV - VISUAL-MOTOR CONTROL

Cluster Score	Subject Frequency	Percent of Total
No Data Recorded*	80	
1.00 - 2.49	242	22.41
2.50 - 3.99	685	63.43
4.00	153	14.17
Total	1080	100.00

Mean	Variance	Standard Deviation	Standard Error
2.91	.49	.70	.02

*Questionable distributions

Table 21

FREQUENCY DISTRIBUTION: PPMS CLUSTER V - FORM PERCEPTION

Cluster Score	Subject Frequency	Percent of Total
No Data Recorded*	88	
1.00 - 2.49	455	42.44
2.50 - 3.99	582	54.29
4.00	35	3.26
Total	1072	100.00

Mean	Variance	Standard Deviation	Standard Error
2.41	.65	.80	.02

*Questionable distributions

Table 22

FREQUENCY DISTRIBUTION: PPMS CLUSTER VI - DIFFERENTIATION

Cluster Score	Subject Frequency	Percent of Total
No Data Recorded*	38	
1.00 - 2.49	242	21.57
2.50 - 3.99	786	70.05
4.00	94	8.38
Total	1122	100.00

Mean	Variance	Standard Deviation	Standard Error
2.89	.43	.66	.02

*Questionable distributions

Table 23

FREQUENCY DISTRIBUTION: PPMS CLUSTER VII - OBSTACLE COURSE

Cluster Score	Subject Frequency	Percent of Total
No Data Recorded*		
1.00 - 2.49	312	26.83
2.50 - 3.50	333	28.73
4.00	515	44.43
Total	1160	100.00

Mean	Variance	Standard Deviation	Standard Error
3.05	1.09	1.05	.03

*Questionable distributions

Table 24

FREQUENCY DISTRIBUTION: PPMS CLUSTER VIII - KRAUS-WEBER

Cluster Score	Subject Frequency	Percent of Total
No Data Recorded*		
1.00 - 2.49	93	8.02
2.50 - 3.99	281	24.22
4.00	786	67.76
Total	1160	100.00

Mean	Variance	Standard Deviation	Standard Error
3.56	.56	.75	.02

*Questionable distributions

The number of deficiencies in these clusters range from 7% to 8% of the population in Balance and Kraus-Weber, to 42% in Form Perception. In four of the eight clusters, failing scores were earned by 21% to 24% of the sample population. The Obstacle Course cluster was failed by 27% of the children tested.

Distribution of PPMS cluster deficits by grade appears in Table 25. As before, deficit scores are regarded as scores of 2.49 or less. Figure 1 graphically displays the percentages of deficit.

Table 25

PERCENTAGE OF PPMS DEFICIENCIES BY CLUSTER AND GRADE

PPMS	Cluster	SE	K	1st	2nd	3rd	4th
I	Ocular Control	54.5 N=114	48.8 N=82	25.2 N=59	24.8 N=64	14.3 N=37	17.2 N=40
II	Rhythmic Writing	64.0 N=134	52.5 N=88	29.8 N=71	24.8 N=65	10.8 N=28	8.6 N=20
III	Balance	22.7 N=48	24.0 N=41	9.7 N=23	7.2 N=19	7.0 N=18	5.2 N=12
IV	Visual Motor Control	53.0 N=112	53.5 N=91	34.5 N=81	28.6 N=74	16.7 N=42	15.0 N=34
V	Form Perception	71.6 N=151	47.0 N=80	47.5 N=113	47.3 N=124	44.0 N=114	44.0 N=103
VI	Differentiation	47.9 N=101	50.6 N=86	37.8 N=80	22.5 N=59	8.5 N=22	10.8 N=25
VII	Obstacle Course	31.7 N=67	44.7 N=76	32.4 N=77	24.0 N=63	21.7 N=56	17.2 N=40
VIII	Kraus-Weber	30.3 N=64	12.4 N=21	9.7 N=23	8.0 N=21	3.5 N=9	8.2 N=19

Note.-- Deficit performance indicated by a score of 2.49 to 1.00.

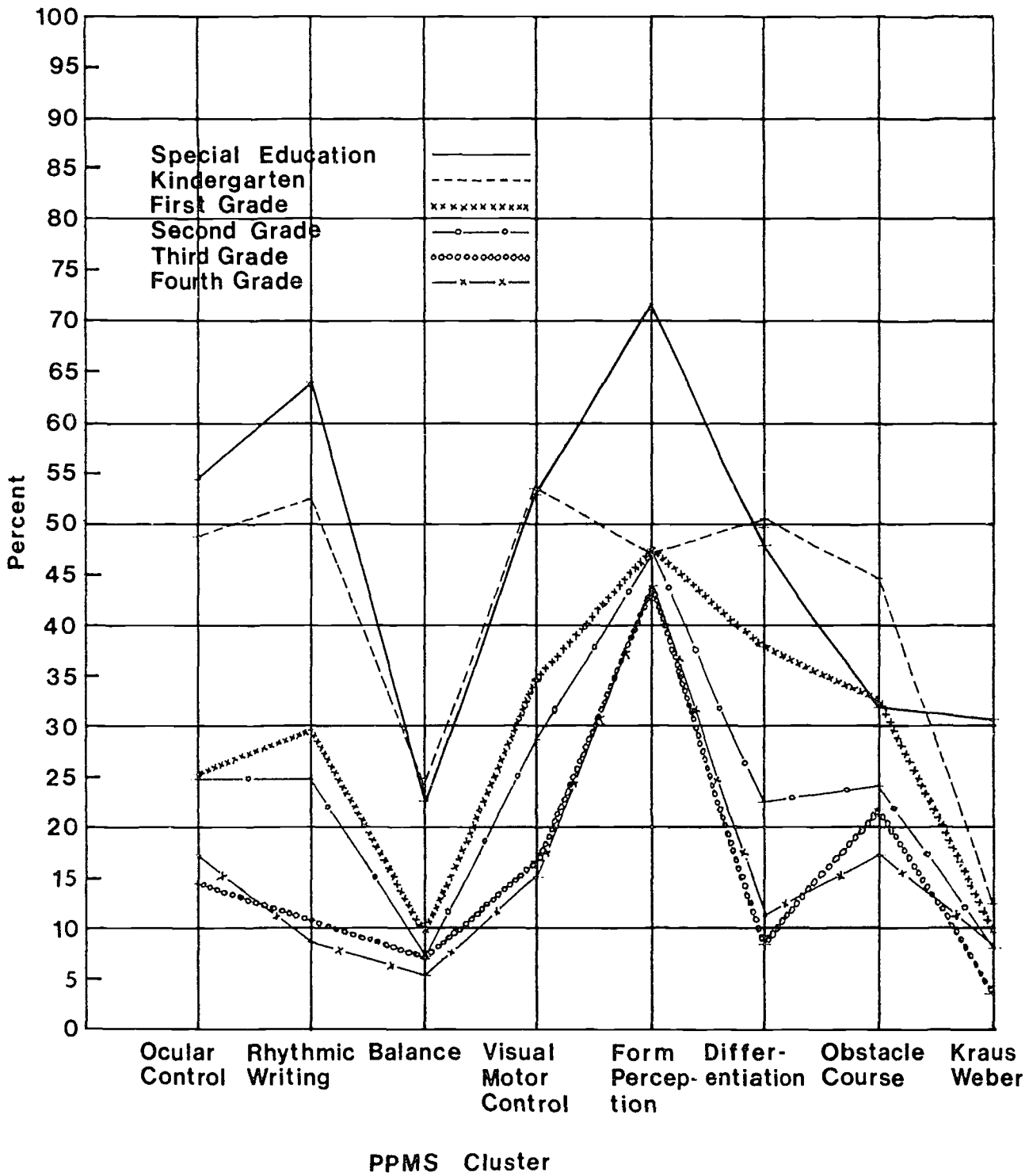

Figure 1 PERCENTAGE OF PPMS DEFICIENCIES BY CLUSTER AND GRADE

The large number of deficiencies in the Special Education sample is followed closely by Kindergarten children. Similar relationships regarding percentage of deficits seems evident between first and second graders, and again between third and fourth graders.

As expected, the developmental nature of the psycho-motor clusters is revealed - the older the child, the less incidence of psycho-motor deficiencies. While children enrolled in Special Education classes exhibit the greatest number of deficits, significant deficiencies are noted in all grades.

Since older children were not included in this study, it cannot be stated with certainty that the percentage of deficits existing at the fourth grade level will not continue to drop. However, changes between grade three and four are very small and in three areas of attention, ie. Ocular Control, Differentation, and Kraus-Weber, third graders actually performed better than fourth graders. This data may indicate that increasing demands on children with marginal psycho-motor skills has adverse effects on further psycho-motor development.

The percentage of failures on Cluster V - Form Perception remains constant from grade to grade with the exception of the larger number of deficit scores among the Special Education sample. It is not clear why these results were obtained. It is possible that the scoring criteria did not adequately discriminate among the children. However, it is also possible that the deficit scores that persist, do indeed, reflect poor visual-motor efficiency and organization skills required in the items of Cluster V.

Virginia Psycho-Motor Screening Instrument (Checklist)

Approximately 169 teachers completed a total of 3174 Checklists for each of 3174 students. Of this total, 1368 children also were evaluated with the PPMS. The remaining 1806 Checklists were obtained on children for whom no other data were available and who were enrolled in Kindergarten through grade four.

For the purpose of evaluating the Checklist data, two separate cluster analyses were performed. The first involved the 1368 Checklists for which PPMS data were available and which was labeled "original data". The second cluster analysis was obtained on the remaining 1806 Checklists and was regarded as a replication analysis. In both cases, the Cluster Analysis Procedure by Tyron and Bailey was used.

The most stringent test of reliability for a measurement instrument is the replication method employed in this project to evaluate the Checklist. By subjecting two large samples of students to independent analyses, it is possible to compare the two groups. The results indicate the discreteness of the factors measured by the Checklist.

From the original 54 questions on the Checklist, 23 items were selected as representing five different psycho-motor factors. These clusters and the items which are included in each cluster represent the oblique unifactor structures generated as a product of the cluster analysis. Also included are the coefficients of inter-correlation for the original sample and the replication sample. The item numbers refer to the numbers of the questions as they appeared in the original Checklist (see Appendix D).

VIRGINIA PSYCHO-MOTOR SCREENING INSTRUMENT

Item No.	Item	Oblique Factor Coefficient Original	Replication
CLUSTER I:	INTERNAL ORGANIZATION		
28	Is it necessary for you to tell him to do one thing at a time (eg. he cannot follow a series of instructions)?	.77	.77
44	Must verbal instructions be repeated several times?	.75	.74
41	Does he have difficulty with copying tasks (eg. writing, drawing, reproducing geometric figures from memory)?	.70	.71
23	In copying written work, must he look back and forth from his paper to the stimulus (he may seem as if he cannot recall the stimulus long enough to reproduce it)?	.69	.71
39	Does he seem overly dependent upon auditory input (eg. he may talk himself through activities; he may be able to follow verbal instructions but not written instructions)?	.66	.67
38	Does he seem to be easily distracted by visual stimuli (eg. he may look frequently at the bulletin board or to other places in the room where there are many visual displays)?	.62	.60
53	Does he have difficulty repeating sentences or numbers?	.62	.58
35	Does he tire quickly from reading or writing?	.61	.61
29	Does he daydream frequently, stare blankly, seem to be attending to nothing?	.57	.56
36	Does he persist in using his finger to keep his place when reading?	.50	.53

Item No.	Item	Oblique Factor Coefficient Original	Replication
CLUSTER II:	SUBDUED ACTIVITY		
52	Does he avoid speaking (eg. he may answer questions with single words or phrases; avoids spontaneous conversations)?	.71	.67
51	Does he talk too softly or frequently whisper a response?	.71	.61
5	Does he seem withdrawn, shy, or unusually inactive?	.68	.72
CLUSTER III:	VISION		
30	Does he often rub his eyes?	.72	.68
31	Does he seem to blink a lot?	.68	.76
32	Does he tend to cover or shade his eyes or single eye frequently?	.62	.63
CLUSTER IV:	OVERFLOW		
37	Is there excessive body shifting or movement when engaged in reading or writing tasks?	.77	.61
3	Does he often seem uncomfortable at his desk (eg. he may wrap his legs around the chair for support or frequently move excessively while working at his desk)?	.69	.71
6	Does his body move from side to side in writing tasks (either in the seat or at the blackboard)?	.68	.58
16	Does he consistently have difficulties in lining up activities (eg. is he excessively restless when standing in the lunch line)?	.55	.60

Item No.	Item	Oblique Factor Coefficient Original	Replication
CLUSTER V:	FINE MOTOR CONTROL		
7	When writing, does he often wrinkle his paper, tear it with his pencil, or is his paper usually messy and smudged?	.69	.72
17	Does he write very heavy (eg. will make dark lines and may often tear holes in his paper) or too lightly?	.66	.63
10	Does he use an excessive amount of paper when writing or drawing (eg. he may start an assignment over many times)?	.53	.56
		N = 1368	1806

A correlation matrix of the Checklist clusters may be found in Table 139 and Table 138 lists the correlation of each of the 23 items selected with each of the Checklist clusters. (See Appendix E.)

Correlations of PPMS clusters and Checklist clusters were obtained using the 1368 children for whom both instruments were administered. Table 140, Appendix E, lists these correlations. Low correlations were obtained and indicate that separate factors are being measured. The highest correlations occurred between Checklist Cluster I, Internal Organization and PPMS Cluster II, Rhythmic Writing, .35; PPMS Cluster VI, Differentiation, .33; and the PPMS Composite Score, .36.

The Checklist clusters have been determined to be of a psycho-motor

nature. This determination was made on the basis of construct validity as interpreted by the Kephart Center.

For the purpose of this study, and until additional validation data can be collected, the five Checklist Clusters are defined as follows:

Cluster I INTERNAL ORGANIZATION

Items included in this cluster appear sensitive to reception of both auditory and/or visual information and the integration of this information with response patterns. The items are particularly sensitive to the maintenance of this integration over time or continuity of integration, i.e. continuity of a single act or several acts sequentially.

Cluster II SUBDUED ACTIVITY

These items detect reduced motor output or activity but are not necessarily indicative of inadequate input or processing of information. The possible causes of reduced output are several, the child may be too hyperkinetic (tense) to move easily or just the opposite, his muscle tonus may be so minimal that the child has difficulty responding to the impulse to move. There may also exist an interference which prevents the initiation of a response or the translation to a response.

Cluster III VISION

These items relate to fatigue of the ocular-motor mechanism or specific muscle stress.

Cluster IV OVERFLOW

These items indicate excessive motor output as characterized by overt movement. Frequently exhibited in the child is excessive tonus in muscles not needed for the task and difficulty relaxing. Such difficulty indicates poor kinesthetic figure-ground.

Cluster V FINE MOTOR CONTROL

These items are sensitive to difficulty in fine motor control and/or the correlation of visual information with fine motor responses. Excessive tension or lack of muscle tonus may be exhibited or difficulty maintaining kinesthetic figure-ground in fine motor tasks.

Tables 26 through 30 indicate the percentage of children who exhibit deficit scores by cluster. The data is derived from the sample of 1368 subjects who also received PPMS scores and excludes the children enrolled in Special Education classes.

A deficit score was regarded as 2.49 or less. For any particular item on the Checklist, a plus (+) score had a numerical value of one and a minus (-) score had a numerical value of three. The numerical values were ordered in this fashion since the items of the Checklist were so stated that a plus response indicated poor psycho-motor behavior.

As in the analysis of the PPMS clusters, the cluster score represents an average of normally distributed scores within the cluster. Using the Convergence Analysis Procedure (see Chapter 4), any atypical or questionable distributions were not included and were labeled "No Data Recorded" on the frequency distribution tables.

Table 26

FREQUENCY DISTRIBUTION: CHECKLIST CLUSTER I - INTERNAL ORGANIZATION

Cluster Score	Subject Frequency	Percent of Total
No Data Recorded*	253	
1.00 - 2.49	147	16.21
2.50 - 3.00	760	83.79
Total	907	100.00

Mean	Variance	Standard Deviation	Standard Error
2.66	.47	.69	.02

*Questionable distributions

Table 27

FREQUENCY DISTRIBUTION: CHECKLIST CLUSTER II - SUBDUED ACTIVITY

Cluster Score	Subject Frequency	Percent of Total
No Data Recorded*	131	
1.00 - 2.49	112	10.88
2.50 - 3.00	917	89.12
Total	1029	100.00

Mean	Variance	Standard Deviation	Standard Error
2.78	.39	.62	.02

*Questionable distributions

Table 28

FREQUENCY DISTRIBUTION: CHECKLIST CLUSTER III - VISION

Cluster Score	Subject Frequency	Percent of Total
No Data Recorded*	53	
1.00 - 2.49	57	5.15
2.50 - 3.00	1050	94.85
Total	1107	100.00

Mean	Variance	Standard Deviation	Standard Error
2.92	.13	.35	.01

*Questionable distributions

Table 29

FREQUENCY DISTRIBUTION: CHECKLIST CLUSTER IV - OVERFLOW

Cluster Score	Subject Frequency	Percent of Total
No Data Recorded*	276	
1.00 - 2.49	100	11.31
2.50 - 3.00	784	88.69
Total	884	100.00

Mean	Variance	Standard Deviation	Standard Error
2.77	.38	.62	.02

*Questionable distributions

Table 30

FREQUENCY DISTRIBUTION: CHECKLIST CLUSTER V - FINE MOTOR CONTROL

Cluster Score	Subject Frequency	Percent of Total
No Data Recorded*	132	
1.00 - 2.49	50	4.86
2.50 - 3.00	978	95.14
Total	1028	100.00

Mean	Variance	Standard Deviation	Standard Error
2.90	.16	.40	.01

*Questionable distributions

Test of Non-Verbal Auditory Discrimination: Experimental Edition (TENVAD)

Table 31 shows the frequency distribution of TENVAD total scores among children who were primarily enrolled in grades two, three and four.

Table 31

FREQUENCY DISTRIBUTION: TENVAD TOTAL SCORE

Total Score	Subject Frequency	Percent Of Total	
No Data Recorded*	717		
01 - 10	2	.31	Low Score
11 - 20	9	1.38	10.00
21 - 30	135	20.64	High Score
31 - 40	417	63.76	48.00
41 - 50	91	13.91	Range
Total	654	100.00	38.00

Mean	Variance	Standard Deviation	Standard Error
34.69	33.23	5.76	.23

*This number predominately includes subjects for whom individual testing was necessary and thus fewer scores were available.

The limited number of TENVAD scores available was due primarily to the difficulty of group testing with children enrolled in Kindergarten, grade one and Special Education classes.

Table 141 in Appendix E indicates the correlations between PPMS clusters and the five subtests and total scores of the TENVAD. Table 142 is a similar table showing the correlations of the Checklist clusters and the TENVAD items. Low correlations exist between the TENVAD items and the PPMS and Checklist clusters. These low correlations indicate that separate factors are being measured.

CHAPTER 7

ANALYSIS OF VARIANCE

The data included in this Chapter are based upon the total sample excluding those children enrolled in Special Education classes. (For an explanation of this exclusion, refer to Chapter 4.)

One Way Analysis of Variance of Independent Variables

Tables 32 - 52 compare the effects of age, intelligence quotient, TENVAD total score, and PPMS composite score with the independent variables: grade level, socio-economic status, sex, race, rural-suburban-urban status, and geographic region.

Grade Level vs Age

Table 32 demonstrates the relationship of chronological age to grade level.

No interlevel statistics for significance are included in this table since the obvious and expected differences between the grades occurred. However, the mean ages for each grade have been included since the average age for a particular grade may vary considerably from one school district or state to the next depending upon the legal age of entrance.

Table 32

ONE WAY ANALYSIS OF VARIANCE:
GRADE LEVEL VS AGE

Independent- Grade Level
Dependent- Age/ Spring, 1972

Grand Mean- 9 (yr/mo)
Total N- 1144

Grade Level	Subjects	Mean	SD
Kindergarten	169	6.7	8.37
1st	237	7.8	8.63
2nd	260	8.8	9.34
3rd	257	10.0	9.35
4th	221	11.0	10.74

SSB = 331265.30 SSW = 99670.64 F = 946.39 DF = 4/1139

Grade Level vs Intelligence Quotient

Table 33 demonstrates the mean difference in intelligence quotient reported per grade level.

As noted in Chapter 5, Table 10, the Grand Mean of 92.52 reflects the inclusion of all subjects in the sample population. The Grand Mean of 98.54 in Table 33 is due to the removal of the Special Education sample.

As an educational practice, it is not economically feasible nor theoretical purposeful to obtain IQ scores on all Kindergarten and first grade students. Typically, the only students in these grades that are evaluated are those suspected of having educational deficits. Consequently, the IQ scores reported for Kindergarten and first grade students in

the sample population reflect the practice of assessing the lowest achieving subjects at those levels. This fact accounts for the low mean IQ scores of children in Kindergarten and first grade.

Table 33

ONE WAY ANALYSIS OF VARIANCE:
GRADE LEVEL VS INTELLIGENCE QUOTIENT

Independent- Grade Level
Dependent- Intelligence Quotient

Grand Mean- 98.54
Total N- 670

Grade Level	Subjects	Mean	SD
Kindergarten	20	69.05	24.06
1st	36	79.25	18.04
2nd	181	102.12	13.22
3rd	211	101.18	14.11
4th	222	98.90	15.41

SSB = 34609.61 SSW = 148138.80 F = 38.84 DF = 4/665

Interlevel Statistics

Grade Level	t for Equal Variance
K - 1st	1.80
K - 2nd	9.61**
K - 3rd	9.04**
K - 4th	7.86**
1st - 2nd	8.88**
1st - 3rd	8.85**
1st - 4th	6.92**
2nd - 3rd	.68
2nd - 4th	2.23*
3rd - 4th	1.61

** Significant at .01 Level of Confidence
* Significant at .05 Level of Confidence

Grade Level vs TENVAD Total Score

Table 34 demonstrates the difference in scores obtained by grade level on the TENVAD.

Table 34

ONE WAY ANALYSIS OF VARIANCE:
GRADE LEVEL VS TENVAD TOTAL SCORE

Independent- Grade Level
Dependent- TENVAD Total Score

Grand Mean- 34.78
Total N- 646

Grade Level	Subjects	Mean	SD
Kindergarten	10	19.90	5.72
1st	29	30.24	5.81
2nd	211	33.13	5.47
3rd	205	35.84	4.85
4th	191	36.94	4.81

SSB = 4504.91 SSW = 16702.75 F = 43.22 DF = 4/641

Interlevel Statistics

Grade Level	t for Equal Variance
K - 1st	4.87**
K - 2nd	7.47**
K - 3rd	10.08**
K - 4th	10.81**
1st - 2nd	2.65**
1st - 3rd	5.68**
1st - 4th	6.79**
2nd - 3rd	5.35**
2nd - 4th	7.37**
3rd - 4th	2.25

** Significant at .01 Level of Confidence
* Significant at .05 Level of Confidence

A developmental progression or increase in total score is indicated from second to fourth grades. However, a statement regarding the developmental progression from Kindergarten to the second grade cannot be made because of the small number of subjects tested in Kindergarten and first grade.

Grade Level vs PPMS Composite Score

Table 35 demonstrates the PPMS composite scores obtained by the sample population by grade level.

As expected, the scores achieved by the sample population on the PPMS (eariler described as the single most comprehensive indicator of psycho-motor ability) follow a perfect developmental progression, i.e. the Kindergarten sample scores are lower than the first grade scores, the first grade scores lower than the second grade, etc. These scores also agree with the theoretical assumption regarding the plateauing of psycho-motor abilities around the chronological ages of 9 to 11 or the grade levels three and four.

Whether or not this incidence of psycho-motor deficiencies decrease beyond the fourth grade is not known. However, the lack of significant differences between the third and fourth grades suggest that the effect of age on psycho-motor ability decreases after grade three. This may indicate that maturational factors are of little significance beyond grades three and four (or ages 10 and 11).

Table 35

ONE WAY ANALYSIS OF VARIANCE:
GRADE LEVEL VS PPMS COMPOSITE SCORE

Independent- Grade Level
Dependent- PPMS Composite Score

Grand Mean- 3.07
Total N- 1103

Grade Level	Subjects	Mean	SD
Kindergarten	158	2.52	.69
1st	224	2.97	.55
2nd	244	3.08	.44
3rd	252	3.28	.46
4th	225	3.30	.39

SSB = 72.68 SSW = 276.94 F = 72.04 DF = 4/1098

Interlevel Statistics

Grade Level	t for Equal Variance
K - 1st	7.18**
K - 2nd	9.95**
K - 3rd	13.32**
K - 4th	13.96**
1st - 2nd	2.33*
1st - 3rd	6.56**
1st - 4th	7.21**
2nd - 3rd	4.84**
2nd - 4th	5.62**
3rd - 4th	.56

** Significant at .01 Level of Confidence
* Significant at .05 Level of Confidence

Socio-Economic Status vs Age

Throughout this study, all tables and discussions relative to comparisons based on socio-economic status must be interpreted with great care. As indicated in Chapter 5, lack of data made it impossible

to verify the method of payment of school lunch as an adequate measure of socio-economic status. Furthermore, the limited number of subjects included in the category of children who partially paid for their lunch does not make it possible to draw inferences for that group.

Table 36 demonstrates the chronological age differences between the subjects of the sample population according to the socio-economic status (lunch status).

Though statistically significant differences do exist with regard to chronological age between the subjects that do not pay for their lunch and those that completely pay, it is of no interpretational value to this study.

Table 36

ONE WAY ANALYSIS OF VARIANCE:
SOCIO-ECONOMIC STATUS (LUNCH STATUS) VS AGE

Independent- Lunch Status
Dependent- Age/ Spring, 1972

Grand Mean- 9.1 (yr/mo)
Total N- 744

Lunch Status	Subjects	Mean	SD
Child Receives Free Lunch	156	9.4	20.48
Child Partially Pays	20	9.3	14.13
Child Pays Total	568	9	18.07

SSB = 3500.02 SSW = 254033.29 F = 5.10 DF = 2/741

Interlevel Statistics

Lunch Status	t for Equal Variance
Free - Partially Pays	.41
Free - Pays Total	3.14**
Partially Pays - Pays Total	.81

** Significant at .01 Level of Confidence

Socio-Economic Status vs Intelligence Quotient

Table 37 demonstrates the IQ differences between the three socio-economic groups earlier defined. The sample size for the two groups of children who received free lunch and those who paid the entire amount was sufficient and the difference between these two groups was significant. Defining the IQ in a traditional manner, as an indicator of intellectual capacity, the data does suggest that the subjects in this sample of the population with the highest intellectual capacity come from the highest socio-economic level. But recent empirical studies have attacked the use of IQ scores as indicators of intelligence, therefore, the inferences drawn from an IQ comparison should be considered tenuous.

Table 37

ONE WAY ANALYSIS OF VARIANCE:
SOCIO-ECONOMIC STATUS (LUNCH STATUS) VS INTELLIGENCE QUOTIENT

Independent- Lunch Status
Dependent- Intelligence Quotient

Grand Mean- 98.06
Total N- 457

Lunch Status	Subjects	Mean	SD
Child Receives Free Lunch	110	88.37	17.52
Child Partially Pays	12	95.00	12.71
Child Pays Total	335	101.35	15.89

SSB = 14052.97 SSW = 119573.55 F = 26.68 DF = 2/454

Interlevel Statistics

Lunch Status	t for Equal Variance
Free - Partially Pays	1.27
Free - Pays Total	7.24**
Pays Total - Partially Pays	1.37

** Significant at .01 Level of Confidence

Socio-Economic Status vs TENVAD Total Score

Table 38 demonstrates the difference in TENVAD total scores obtained by subjects at various socio-economic levels.

Non-Verbal Auditory Discrimination Scores are significantly higher for subjects at the "Pays Total" socio-economic level.

Table 38

ONE WAY ANALYSIS OF VARIANCE:
SOCIO-ECONOMIC STATUS (LUNCH STATUS) VS TENVAD TOTAL SCORE

Independent- Lunch Status
Dependent- TENVAD Total Score

Grand Mean- 35.40
Total N- 457

Lunch Status	Subjects	Mean	SD
Child Receives Free Lunch	90	33.07	5.81
Child Partially Pays	10	36.80	5.53
Child Pays Total	357	35.95	5.06

SSB = 618.53 SSW = 12407.39 F = 11.32 DF = 2/454

Interlevel Statistics

Lunch Status	t for Equal Variance
Free - Partially Pays	1.94
Free - Pays Total	4.69**
Partially Pays - Pays Total	.52

** Significant at .01 Level of Confidence

Socio-Economic Status vs PPMS Composite Score

Table 39 demonstrates the difference by level of socio-economic status in the scores obtained by the sample population on the PPMS. As in the previous table (Table 38) the subjects from the "Pays Total" group demonstrate more proficiency in performance than the group that received free lunch.

Table 39

ONE WAY ANALYSIS OF VARIANCE:
SOCIO-ECONOMIC STATUS (LUNCH STATUS) VS PPMS COMPOSITE SCORE

Independent- Lunch Status
Dependent- PPMS Composite Score

Grand Mean- 3.07
Total N- 714

Lunch Status	Subjects	Mean	SD
Child Receives Free Lunch	151	2.88	.57
Child Partially Pays	20	2.99	.27
Child Pays Total	543	3.12	.51

SSB = 7.35 SSW = 193.89 F = 13.47 DF = 2/711

Interlevel Statistics

Lunch Status	t for Equal Variance
Free - Partially Pays	.89
Free - Pays Total	5.10**
Partially Pays - Pays Total	1.14

** Significant at .01 Level of Confidence

Sex vs Intelligence Quotient

Table 40 demonstrates the difference between sex classifications according to IQ scores reported.

The female subjects in the sample population are reported to have somewhat significantly higher IQ scores. This relationship is considered typical for large sample investigations.

Table 40

ONE WAY ANALYSIS OF VARIANCE:
SEX VS INTELLIGENCE QUOTIENT

Independent- Sex
Dependent- Intelligence Quotient

Grand Mean- 98.56
Total N- 662

Sex	Subjects	Mean	SD
Male	336	96.92	16.57
Female	326	100.25	16.34

SSB = 1833.60 SSW = 178741.36 F = 6.77 DF = 1/660

Interlevel Statistics

Sex	t for Equal Variance
Male - Female	2.60*

* Significant at .05 Level of Confidence

Sex vs TENVAD Total Score

One way analysis of variance between sex and total score for the TENVAD was completed. Since no significant differences appeared, no table is included.

Sex vs PPMS Composite Score

Table 41 demonstrates the difference between PPMS scores obtained by the subjects of the study by sex classification.

Table 41

ONE WAY ANALYSIS OF VARIANCE:
SEX VS PPMS COMPOSITE SCORE

Independent- Sex
Dependent- PPMS Composite Score

Grand Mean- 3.06
Total N- 1093

Sex	Subjects	Mean	SD
Male	544	3.01	.59
Female	549	3.12	.53

SSB = 3.22 SSW = 342.60 F = 10.26 DF = 1/1091

Interlevel Statistics

Sex	t for Equal Variance
Male - Female	3.20**

** Significant at .01 Level of Confidence

Race vs Age

As indicated in Table 13 (Chapter 5), of the total sample, only five subjects constitute the "Other" category. So for the purpose of analysis, that category is collapsed into the "Black" classification. This procedure is followed in all analyses of variance involving race.

An analysis of variance between race and chronological age was ob-

tained. Since no significant differences occurred, no table has been included.

Race vs Intelligence Quotient

Table 42 demonstrates the difference between race classifications according to IQ scores reported.

The "White" subjects have an average IQ significantly higher than the "Black" subjects as shown by test scores entered in permanent school records.

Table 42

ONE WAY ANALYSIS OF VARIANCE:
RACE VS INTELLIGENCE QUOTIENT

Independent- Race
Dependent- Intelligence Quotient

Grand Mean- 2.66
Total N- 670

Race	Subjects	Mean	SD
White	481	101.78	15.52
Black	189	90.31	16.20

SSB = 17846.46 SSW = 164901.95 F = 72.29 DF = 1/668

Interlevel Statistics

Race	t for Equal Variance
White - Black	8.50**

** Significant at .01 Level of Confidence

Race vs TENVAD Total Score

Table 43 demonstrates the difference between the TENVAD total scores according to race classification.

The mean TENVAD total score obtained by the "White" subjects is significantly higher than that of the "Black" subjects.

Table 43

ONE WAY ANALYSIS OF VARIANCE:
RACE VS TENVAD TOTAL SCORE

Independent- Race
Dependent- TENVAD Total Score

Grand Mean- 34.78
Total N- 646

Race	Subjects	Mean	SD
White	488	35.66	5.27
Black	158	32.07	6.26

SSB = 1540.21 SSW = 19667.45 F = 50.43 DF = 1/644

Interlevel Statistics

Race	t for Equal Variance
White - Black	7.10**

** Significant at .01 Level of Confidence

Race vs PPMS Composite Score

Table 44 demonstrates the difference between the PPMS Composite scores achieved by the subjects of the sample population according to race classification.

The mean PPMS composite score for the "White" subjects is somewhat higher than the mean score for the "Black" subjects.

Table 44

ONE WAY ANALYSIS OF VARIANCE:
RACE VS PPMS COMPOSITE SCORE

Independent- Race
Dependent- PPMS Composite Score

Grand Mean- 3.07
Total N- 1103

Race	Subjects	Mean	SD
White	800	3.09	.54
Black	303	3.01	.61

SSB = 1.47 SSW = 348.15 F = 4.64 DF = 1/1101

Interlevel Statistics

Race	t for Equal Variance
White - Black	2.15*

* Significant at .05 Level of Confidence

Rural-Suburban-Urban Status vs Age

Table 45 demonstrates the difference between the rural-suburban-urban status of the sample population according to chronological age.

Though significant differences are reflected in this table, this relationship is probably not of essential consequence to this study.

Table 45

ONE WAY ANALYSIS OF VARIANCE:
RURAL-SUBURBAN-URBAN STATUS VS AGE

Independent- R-S-U Status
Dependent- Age/ Spring, 1972

Grand Mean- 9 (yr/mo)
Total N- 1125

Rural-Suburban-Urban Status	Subjects	Mean	SD
Rural	565	9.1	19.35
Suburban	435	9.0	19.80
Urban	125	8.6	18.75

SSB = 4061.93 SSW = 424773.98 F = 5.36 DF = 2/1122

Interlevel Statistics

Rural-Suburban-Urban Status	t for Equal Variance
Rural - Suburban	1.37
Rural - Urban	3.28**
Suburban- Urban	2.28*

** Significant at .01 Level of Confidence
* Significant at .05 Level of Confidence

Rural-Suburban-Urban Status vs Intelligence Quotient

Table 46 demonstrates the difference between the rural-suburban-urban status of the sample population according to IQ scores reported.

Both rural and urban samples are reported to have significantly lower IQ scores than the suburban sample. However, the number of urban subjects for whom data were available was small and inferences should not

be based upon this group.

Table 46

ONE WAY ANALYSIS OF VARIANCE:
RURAL-SUBURBAN-URBAN STATUS VS INTELLIGENCE QUOTIENT

Independent- R-S-U Status
Dependent- Intelligence Quotient

Grand Mean- 98.42
Total N- 661

Rural-Suburban-Urban Status	Subjects	Mean	SD
Rural	355	95.03	17.39
Suburban	268	103.46	14.50
Urban	38	94.61	12.80

SSB = 11448.68 SSW = 169230.40 F = 22.26 DF = 2/658

Interlevel Statistics

Rural-Suburban-Urban Status	t for Equal Variance
Rural - Suburban	6.43**
Rural - Urban	.14
Suburban - Urban	3.57**

** Significant at .01 Level of Confidence

Rural -Suburban-Urban Status vs TENVAD Total Score

Table 47 demonstrates the difference between the rural-suburban-urban status of the sample population according to TENVAD total scores obtained.

The sample size of the urban group is too small to use for infer-

ential purposes. And there are no significant differences between the TENVAD means of the rural and the suburban groups.

Table 47

ONE WAY ANALYSIS OF VARIANCE:
RURAL-SUBURBAN-URBAN STATUS VS TENVAD TOTAL SCORE

Independent- R-S-U Status
Dependent- TENVAD Total Score

Grand Mean- 34.75
Total N- 638

Rural-Suburban-Urban Status	Subjects	Mean	SD
Rural	319	34.87	5.28
Suburban	260	35.27	5.63
Urban	59	31.83	7.65

SSB = 576.65 SSW = 20468.72 F = 8.94 DF = 2/635

Interlevel Statistics

Rural-Suburban-Urban Status	t for Equal Variance
Rural - Suburban	.87
Rural - Urban	3.76**
Suburban - Urban	3.94**

** Significant at .01 Level of Confidence

Rural-Suburban-Urban Status vs PPMS Composite Score

Table 48 demonstrates the difference between the rural-suburban-urban status of the sample population according to the PPMS composite scores obtained.

No significant differences are noted.

Table 48

ONE WAY ANALYSIS OF VARIANCE:
RURAL-SUBURBAN-URBAN STATUS VS PPMS COMPOSITE SCORE

Independent- R-S-U Status
Dependent- PPMS Composite Score

Grand Mean- 3.07
Total N- 1083

Rural-Suburban-Urban Status	Subjects	Mean	SD
Rural	544	3.08	.54
Suburban	419	3.07	.57
Urban	120	3.02	.68

SSB = .41 SSW = 346.23 F = .64 DF = 2/1080

Interlevel Statistics

Rural-Suburban-Urban Status	t for Equal Variance
Rural - Suburban	.46
Rural - Urban	1.13
Suburban - Urban	.77

Geographic Region vs Age

Table 49 demonstrates the difference reported in mean chronological age by geographic region.

Though significant differences are noted they are not considered of consequence to this study.

Table 49

ONE WAY ANALYSIS OF VARIANCE:
GEOGRAPHIC REGION VS AGE

Independent- Geographic Region
Dependent- Age/ Spring, 1972

Grand Mean- 9 (yr/mo)
Total N- 1144

Geographic Region	Subjects	Mean	SD
Southwest	223	8.8	20.90
Valley	177	8.8	17.88
Northern	173	9.2	16.88
Southside	179	9.3	19.69
Central	231	8.8	21.33
Tidewater	161	9.4	16.82

SSB = 9769.56 SSW = 421166.39 F = 5.28 DF = 5/1138

Interlevel Statistics

Geographic Region	t for Equal Variance
Southwest - Valley	.19
Southwest - Northern	2.28*
Southwest - Southside	2.96**
Southwest - Central	.07
Southwest - Tidewater	3.18**
Valley - Northern	2.60*
Valley - Southside	3.23**
Valley - Central	.12
Valley - Tidewater	3.55**
Northern - Southside	.82
Northern - Central	2.33*
Northern - Tidewater	1.03
Southside - Central	3.01**
Southside - Tidewater	.15
Central - Tidewater	3.22**

** Significant at .01 Level of Confidence
* Significant at .05 Level of Confidence

Geographic Region vs Intelligence Quotient

Table 50 demonstrates the difference reported in mean IQ scores according to geographic region.

Only the IQ scores reported for the subjects from the Southside region are significantly low.

Table 50

ONE WAY ANALYSIS OF VARIANCE:
GEOGRAPHIC REGION VS INTELLIGENCE QUOTIENT

Independent- Geographic Region
Dependent- Intelligence Quotient

Grand Mean- 98.54
Total N- 670

Geographic Region	Subjects	Mean	SD
Southwest	121	101.03	14.74
Valley	112	102.20	13.89
Northern	76	100.91	16.12
Southside	136	89.16	19.65
Central	118	102.42	15.78
Tidewater	107	97.85	13.03

SSB = 16467.65 SSW = 166280.76 F = 13.15 DF = 5/664

Table 50 (continued)

Interlevel Statistics

Geographic Region	t for Equal Variance
Southwest - Valley	.62
Southwest - Northern	.06
Southwest - Southside	5.42**
Southwest - Central	.70
Southwest - Tidewater	1.72
Valley - Northern	.58
Valley - Southside	5.91**
Valley - Central	.12
Valley - Tidewater	2.38*
Northern - Southside	4.44**
Northern - Central	.65
Northern - Tidewater	1.42
Southside - Central	5.87**
Southside - Tidewater	3.94**
Central - Tidewater	2.36*

** Significant at .01 Level of Confidence
* Significant at .05 Level of Confidence

Geographic Region vs TENVAD Total Score

Table 51 demonstrates the difference between mean TENVAD total scores achieved by the sample population according to geographic region.

While some significant differences are noted, the meaning of these differences are not known.

Table 51

ONE WAY ANALYSIS OF VARIANCE:
GEOGRAPHIC REGION VS TENVAD TOTAL SCORE

Independent- Geographic Region
Dependent- TENVAD Total Score

Grand Mean- 34.78
Total N- 646

Geographic Region	Subjects	Mean	SD
Southwest	107	35.69	4.81
Valley	78	36.13	4.76
Northern	118	35.05	5.45
Southside	98	34.09	5.42
Central	140	33.74	6.49
Tidewater	105	34.60	6.50

SSB = 441.83 SSW = 20765.83 F = 2.72 DF = 5/640

Interlevel Statistics

Geographic Region	t for Equal Variance
Southwest - Valley	.61
Southwest - Northern	.93
Southwest - Southside	2.24*
Southwest - Central	2.62*
Southwest - Tidewater	1.39
Valley - Northern	1.42
Valley - Southside	2.61*
Valley - Central	2.86**
Valley - Tidewater	1.76
Northern - Southside	1.29
Northern - Central	1.74
Northern - Tidewater	.56
Southside - Central	.45
Southside - Tidewater	.60
Tidewater - Central	1.03

** Significant at .01 Level of Confidence
* Significant at .05 Level of Confidence

Geographic Region vs PPMS Composite Score

Table 52 demonstrates the difference between mean PPMS composite scores achieved by the sample population according to geographic regions.

Total scores of the PPMS are significantly lower among children in the Southwest and Valley regions of the state.

Table 52

ONE WAY ANALYSIS OF VARIANCE:
GEOGRAPHIC REGION VS PPMS COMPOSITE SCORE

Independent- Geographic Region
Dependent- PPMS Composite Score

Grand Mean- 3.07
Total N- 1103

Geographic Region	Subjects	Mean	SD
Southwest	220	2.94	.54
Valley	184	2.98	.62
Northern	164	3.13	.44
Southside	165	3.06	.64
Central	217	3.15	.59
Tidewater	153	3.18	.46

SSB = 9.27 SSW = 340.34 F = 5.98 DF = 5/1097

Table 52 (continued)

Interlevel Statistics

Geographic Region	t for Equal Variance
Southwest - Valley	.71
Southwest - Northern	3.76**
Southwest - Southside	2.08*
Southwest - Central	3.90**
Southwest - Tidewater	4.52**
Valley - Northern	2.65**
Valley - Southside	1.26
Valley - Central	2.83**
Valley - Tidewater	3.35**
Northern - Southside	1.14
Northern - Central	.30
Northern - Tidewater	.95
Southside - Central	1.36
Southside - Tidewater	1.87
Central - Tidewater	.55

** Significant at .01 Level of Confidence
* Significant at .05 Level of Confidence

One Way Analysis of Variance of PPMS and Checklist Clusters

One Way Analyses of Variance were obtained for each of the PPMS Clusters and the Virginia Checklist Clusters with the independent variables grade level, socio-economic status, sex, race and rural-suburban-urban status. Again, these analyses are based upon the total sample excluding the children enrolled in Special Education classes.

All clusters examined in the Analyses of Variance were subjected to the Convergence Analysis procedure described in Chapter 4.

The only tables included are those in which significant relationships at the .01 Level of Confidence were obtained.

PPMS Clusters vs Grade Level

Tables 53 - 60 indicate changes that occur with grade and age.

Table 53

ONE WAY ANALYSIS OF VARIANCE:
GRADE LEVEL VS PPMS CLUSTER I - OCULAR CONTROL

Independent- Grade Level
Dependent- PPMS Cluster I

Grand Mean- 2.90
Total N- 1152

Grade Level	Subjects	Mean	SD
Kindergarten	169	2.40	.90
1st	236	2.83	.75
2nd	260	2.91	.76
3rd	257	3.11	.66
4th	230	3.07	.66

SSB = 61.46 SSW = 627.24 F = 28.10 DF = 4/1147

Interlevel Statistics

Grade Level	t for Equal Variance
Kindergarten - 1st	5.35**
Kindergarten - 2nd	6.42**
Kindergarten - 3rd	9.38**
Kindergarten - 4th	8.60**
1st - 2nd	1.18
1st - 3rd	4.30**
1st - 4th	3.57**
2nd - 3rd	3.08**
2nd - 4th	2.38*
3rd - 4th	.66

** Significant at .01 Level of Confidence
* Significant at .05 Level of Confidence

Table 54

ONE WAY ANALYSIS OF VARIANCE:
GRADE LEVEL VS PPMS CLUSTER II - RHYTHMIC WRITING

Independent- Grade Level
Dependent- PPMS Cluster II

Grand Mean- 2.92
Total N- 1154

Grade Level	Subjects	Mean	SD
Kindergarten	170	2.42	.79
1st	236	2.86	.69
2nd	260	2.86	.56
3rd	257	3.13	.51
4th	231	3.17	.49

SSB = 70.06 SSW = 421.83 F = 47.71 DF = 4/1149

Interlevel Statistics

Grade Level	t for Equal Variance
Kindergarten - 1st	5.94**
Kindergarten - 2nd	6.67**
Kindergarten - 3rd	11.26**
Kindergarten - 4th	11.68**
1st - 2nd	.09
1st - 3rd	4.93**
1st - 4th	5.57**
2nd - 3rd	5.82**
2nd - 4th	6.60**
3rd - 4th	.91

** Significant at .01 Level of Confidence

Table 55

ONE WAY ANALYSIS OF VARIANCE:
GRADE LEVEL VS PPMS CLUSTER III - BALANCE

Independent- Grade Level
Dependent- PPMS Cluster III

Grand Mean- 3.29
Total N- 1134

Grade Level	Subjects	Mean	SD
Kindergarten	165	3.02	.65
1st	230	3.24	.53
2nd	254	3.32	.52
3rd	255	3.37	.51
4th	230	3.39	.47

SSB = 17.39 SSW = 320.38 F = 15.32 DF = 4/1129

Interlevel Statistics

Grade Level	t for Equal Variance
Kindergarten - 1st	3.69**
Kindergarten - 2nd	5.35**
Kindergarten - 3rd	6.22**
Kindergarten - 4th	6.69**
1st - 2nd	1.85
1st - 3rd	2.84**
1st - 4th	3.36**
2nd - 3rd	.99
2nd - 4th	1.50
3rd - 4th	.51

** Significant at .01 Level of Confidence

Table 56

ONE WAY ANALYSIS OF VARIANCE:
GRADE LEVEL VS PPMS CLUSTER IV - VISUAL MOTOR CONTROL

Independent- Grade Level
Dependent- PPMS Cluster IV

Grand Mean- 2.91
Total N- 1080

Grade Level	Subjects	Mean	SD
Kindergarten	161	2.38	.70
1st	212	2.83	.67
2nd	246	2.87	.68
3rd	243	3.14	.62
4th	218	3.15	.59

SSB = 71.42 SSW = 455.07 F = 42.18 DF = 4/1075

Interlevel Statistics

Grade Level	t for Equal Variance
Kindergarten - 1st	6.24**
Kindergarten - 2nd	6.96**
Kindergarten - 3rd	11.30**
Kindergarten - 4th	11.55**
1st - 2nd	.60
1st - 3rd	5.05**
1st - 4th	5.27**
2nd - 3rd	4.56**
2nd - 4th	4.77**
3rd - 4th	.25

** Significant at .01 Level of Confidence

Table 57

ONE WAY ANALYSIS OF VARIANCE:
GRADE LEVEL VS PPMS CLUSTER V - FORM PERCEPTION

Independent- Grade Level
Dependent- PPMS Cluster V

Grand Mean- 2.41
Total N- 1072

Grade Level	Subjects	Mean	SD
Kindergarten	162	2.24	.88
1st	213	2.43	.78
2nd	237	2.39	.79
3rd	247	2.48	.78
4th	213	2.46	.80

SSB = 6.60 SSW = 686.91 F = 2.56 DF = 4/1067

Interlevel Statistics

Grade Level	t for Equal Variance
Kindergarten - 1st	2.20*
Kindergarten - 2nd	1.76
Kindergarten - 3rd	2.86**
Kindergarten - 4th	2.56*
1st - 2nd	.55
1st - 3rd	.66
1st - 4th	.43
2nd - 3rd	1.25
2nd - 4th	.99
3rd - 4th	.21

** Significant at .01 Level of Confidence
* Significant at .05 Level of Confidence

Table 58

ONE WAY ANALYSIS OF VARIANCE:
GRADE LEVEL VS PPMS CLUSTER VI - DIFFERENTIATION

Independent- Grade Level
Dependent- PPMS Cluster VI

Grand Mean- 2.89
Total N - 1122

Grade Level	Subjects	Mean	SD
Kindergarten	160	2.41	.72
1st	230	2.62	.60
2nd	251	2.89	.56
3rd	254	3.14	.54
4th	227	3.24	.57

SSB = 97.74 SSW = 387.70 F = 70.40 DF = 4/1117

Interlevel Statistics

Grade Level	t for Equal Variance
Kindergarten - 1st	3.15**
Kindergarten - 2nd	7.64**
Kindergarten - 3rd	11.91**
Kindergarten - 4th	12.68**
1st - 2nd	5.18**
1st - 3rd	10.20**
1st - 4th	11.34**
2nd - 3rd	5.16**
2nd - 4th	6.66**
3rd - 4th	1.82

** Significant at .01 Level of Confidence

Table 59

ONE WAY ANALYSIS OF VARIANCE:
GRADE LEVEL VS PPMS CLUSTER VII - OBSTACLE COURSE

Independent- Grade Level
Dependent- PPMS Cluster VII

Grand Mean- 3.05
Total N- 1159

Grade Level	Subjects	Mean	SD
Kindergarten	170	2.57	1.06
1st	238	2.90	1.07
2nd	261	3.14	1.04
3rd	258	3.22	.97
4th	232	3.25	.97

SSB = 63.85 SSW = 1203.45 F = 15.31 DF = 4/1154

Interlevel Statistics

Grade Level	t for Equal Variance
Kindergarten - 1st	3.06**
Kindergarten - 2nd	5.51**
Kindergarten - 3rd	6.57**
Kindergarten - 4th	6.67**
1st - 2nd	2.56**
1st - 3rd	3.56**
1st - 4th	3.73**
2nd - 3rd	.94
2nd - 4th	1.19
3rd - 4th	.29

** Significant at .01 Level of Confidence

Table 60

ONE WAY ANALYSIS OF VARIANCE:
GRADE LEVEL VS PPMS CLUSTER VIII - KRAUS-WEBER

Independent- Grade Level
Dependent- PPMS Cluster VIII

Grand Mean- 3.56
Total N- 1160

Grade Level	Subjects	Mean	SD
Kindergarten	170	3.33	.80
1st	238	3.45	.81
2nd	262	3.55	.74
3rd	258	3.75	.55
4th	232	3.63	.77

SSB = 22.35 SSW = 625.54 F = 10.32 DF = 4/1155

Interlevel Statistics

Grade Level	t for Equal Variance
Kindergarten - 1st	1.53
Kindergarten - 2nd	2.97**
Kindergarten - 3rd	6.48**
Kindergarten - 4th	3.79**
1st - 2nd	1.43
1st - 3rd	4.81**
1st - 4th	2.40*
2nd - 3rd	3.45**
2nd - 4th	1.11
3rd - 4th	2.04*

** Significant at .01 Level of Confidence
* Significant at .05 Level of Confidence

Nearly all of the clusters reveal improving skill with grade. The one exception is the cluster - Form Perception (Table 57). The only significant difference occurs between Kindergarten and third grade. This apparent failure of Form Perception to improve with grade may be attributed to too stringent scoring criteria.

Leveling off or plateauing is observed in most of the clusters. Common to Ocular Control, Rhythmic Writing, Balance, and Visual Motor Control (Tables 53, 54, 55, 56) is a lack of significant difference between grades one and two and between three and four. With Balance, the leveling off begins earlier at grade two; a pattern is also exhibited in Obstacle Course and Differentiation (Tables 58,59) which level off only at grade three.

The Kraus-Weber exhibits gradual increases from grade to grade, but a significant increase from grade two to three and surprisingly, a moderate decrease from grade three to four (Table 60).

PPMS Clusters vs Socio-Economic Status

Tables 61 - 64 indicate that children who qualified for free lunch have significantly poorer scores on Ocular Control, Rhythmic Writing, Differentiation, and Obstacle Course than those who entirely paid for their lunch.

Table 61

ONE WAY ANALYSIS OF VARIANCE:
SOCIO-ECONOMIC STATUS (LUNCH STATUS)
VS PPMS CLUSTER I - OCULAR CONTROL

Independent- Lunch Status
Dependent- PPMS Cluster I

Grand Mean- 2.90
Total N- 743

Lunch Status	Subjects	Mean	SD
Child Receives Free Lunch	157	2.67	.74
Child Partially Pays	21	2.96	.66
Child Pays Total	565	2.96	.72

SSB = 11.00 SSW = 387.43 F = 10.51 DF = 2/740

Interlevel Statistics

Lunch Status	t for Equal Variance
Free - Partially Pays	1.76
Free - Pays Total	4.56**
Partially Pays - Pays Total	.00

** Significant at .01 Level of Confidence

Table 62

ONE WAY ANALYSIS OF VARIANCE:
SOCIO-ECONOMIC STATUS (LUNCH STATUS)
VS PPMS CLUSTER II - RHYTHMIC WRITING

Independent- Lunch Status
Dependent- PPMS Cluster II

Grand Mean- 2.95
Total N- 745

Lunch Status	Subjects	Mean	SD
Child Receives Free Lunch	159	2.81	.63
Child Partially Pays	21	2.81	.49
Child Pays Total	565	2.99	.62

SSB = 4.58 SSW = 282.98 F = 6.01 DF = 2/742

Interlevel Statistics

Lunch Status	t for Equal Variance
Free - Partially Pays	.01
Free - Pays Total	3.28**
Partially Pays - Pays Total	1.35

** Significant at .01 Level of Confidence

Table 63

ONE WAY ANALYSIS OF VARIANCE:
SOCIO-ECONOMIC STATUS (LUNCH STATUS)
VS PPMS CLUSTER VI - DIFFERENTIATION

Independent- Lunch Status
Dependent- PPMS Cluster VI

Grand Mean- 2.89
Total N- 729

Lunch Status	Subjects	Mean	SD
Child Receives Free Lunch	154	2.65	.67
Child Partially Pays	19	2.90	.68
Child Pays Total	556	2.96	.61

SSB = 11.01 SSW = 280.61 F = 14.24 DF = 2/726

Interlevel Statistics

Lunch Status	t for Equal Variance
Free - Partially Pays	1.53
Free - Pays Total	5.35**
Partially Pays - Pays Total	.37

** Significant at .01 Level of Confidence

Table 64

ONE WAY ANALYSIS OF VARIANCE:
SOCIO-ECONOMIC STATUS (LUNCH STATUS)
VS PPMS CLUSTER VII - OBSTACLE COURSE

Independent- Lunch Status
Dependent- PPMS Cluster VII

Grand Mean- 2.98
Total N- 748

Lunch Status	Subjects	Mean	SD
Child Receives Free Lunch	159	2.70	1.13
Child Partially Pays	21	3.19	1.17
Child Pays Total	568	3.05	1.02

SSB = 16.15 SSW = 818.46 F = 7.35 DF = 2/745

Interlevel Statistics

Lunch Status	t for Equal Variance
Free - Partially Pays	1.87
Free - Pays Total	3.73**
Partially Pays - Pays Total	.63

** Significant at .01 Level of Confidence

PPMS Clusters vs Sex

Tables 65 - 67 indicate that females have significantly higher scores than males on the clusters Ocular Control, Rhythmic Writing, and Differentiation.

Table 65

ONE WAY ANALYSIS OF VARIANCE:
SEX VS PPMS CLUSTER I - OCULAR CONTROL

Independent- Sex
Dependent- PPMS Cluster I

Grand Mean- 2.89
Total N- 1142

Sex Status	Subjects	Mean	SD
Male	572	2.82	.79
Female	570	2.96	.75

SSB = 6.31 SSW = 675.06 F = 10.66 DF = 1/1140

Interlevel Statistics

Sex Status	t for Equal Variance
Male - Female	3.26**

** Significant at .01 Level of Confidence

Table 66

ONE WAY ANALYSIS OF VARIANCE:
SEX VS PPMS CLUSTER II - RHYTHMIC WRITING

Independent- Sex
Dependent- PPMS Cluster II

Grand Mean- 2.92
Total N- 1144

Sex Status	Subjects	Mean	SD
Male	572	2.85	.66
Female	572	2.99	.64

SSB = 5.59 SSW = 479.11 F = 13.33 Df = 1/1142

Interlevel Statistics

Sex Status	t for Equal Variance
Male - Female	3.65**

** Significant at .01 Level of Confidence

Table 67

ONE WAY ANALYSIS OF VARIANCE:
SEX VS PPMS CLUSTER VI - DIFFERENTIATION

Independent- Sex
Dependent- PPMS Cluster VI

Grand Mean- 2.89
Total N- 1112

Sex Status	Subjects	Mean	SD
Male	555	2.82	.68
Female	557	2.96	.63

SSB = 6.02 SSW = 457.89 F = 14.03 DF = 1/1110

Interlevel Statistics

Sex Status	t for Equal Variance
Male - Female	3.75**

** Significant at .01 Level of Confidence

PPMS Clusters vs Race

Tables 68 and 69 reveal that "Whites" have significantly higher scores than "Blacks" only on the clusters Differentiation and Kraus-Weber.

Table 68

ONE WAY ANALYSIS OF VARIANCE:
RACE VS PPMS CLUSTER VI - DIFFERENTIATION

Independent- Race
Dependent- PPMS Cluster VI

Grand Mean- 2.89
Total N- 1122

Race	Subjects	Mean	SD
White	817	2.93	.65
Black	305	2.79	.66

SSB = 5.76 SSW = 480.67 F = 11.10 DF = 1/1120

Interlevel Statistics

Race	t for Equal Variance
White - Black	3.33**

** Significant at .01 Level of Confidence

Table 69

ONE WAY ANALYSIS OF VARIANCE:
RACE VS PPMS CLUSTER VIII - KRAUS-WEBER

Independent- Race
Dependent- PPMS Cluster VIII

Grand Mean- 3.56
Total N- 1160

Race	Subjects	Mean	SD
White	841	3.63	.70
Black	319	3.38	.84

SSB = 13.79 SSW = 634.11 F = 25.18 DF = 1/1158

Interlevel Statistics

Race	t for Equal Variance
White - Black	5.02**

** Significant at .01 Level of Confidence

PPMS Clusters vs Rural-Suburban-Urban Status

Table 70 indicates that rural children have significantly higher scores on Visual Motor Control than either suburban or urban children.

Table 70

ONE WAY ANALYSIS OF VARIANCE:
RURAL-SUBURBAN-URBAN STATUS VS
PPMS CLUSTER IV - VISUAL MOTOR CONTROL

Independent- R-S-U Status
Dependent- PPMS Cluster IV

Grand Mean- 2.91
Total N- 1062

Rural-Suburban-Urban Status	Subjects	Mean	SD
Rural	533	3.03	.67
Suburban	415	2.78	.68
Urban	114	2.80	.82

SSB = 15.52 SSW = 506.27 F = 16.24 DF = 2/1059

Interlevel Statistics

Rural-Suburban-Urban Status	t for Equal Variance
Rural - Suburban	5.56**
Rural - Urban	3.13**
Suburban - Urban	.25

** Significant at .01 Level of Confidence

Table 71 indicates that both rural and suburban children have higher scores on Form Perception than urban children.

Table 71

ONE WAY ANALYSIS OF VARIANCE:
RURAL-SUBURBAN-URBAN STATUS VS
PPMS CLUSTER V - FORM PERCEPTION

Independent- R-S-U Status
Dependent- PPMS Cluster V

Grand Mean- 2.40
Total N- 1053

Rural-Suburban-Urban Status	Subjects	Mean	SD
Rural	513	2.50	.75
Suburban	420	2.37	.85
Urban	120	2.09	.78

SSB = 16.96 SSW = 662.76 F = 13.44 DF = 2/1050

Interlevel Statistics

Rural-Suburban-Urban Status	t for Equal Variance
Rural - Suburban	2.39*
Rural - Urban	5.37**
Suburban - Urban	3.30**

** Significant at .01 Level of Confidence
* Significant at .05 Level of Confidence

Table 72 indicates children from suburban areas have higher Kraus-Weber scores than those from rural and urban areas.

Table 72

ONE WAY ANALYSIS OF VARIANCE:
RURAL-SUBURBAN-URBAN STATUS VS
PPMS CLUSTER VIII - KRAUS-WEBER

Independent- R-S-U Status
Dependent- PPMS Cluster VIII

Grand Mean- 3.56
Total N- 1140

Rural-Suburban-Urban Status	Subjects	Mean	SD
Rural	566	3.50	.78
Suburban	449	3.67	.64
Urban	125	3.42	.88

SSB = 10.27 SSW = 624.55 F = 9.35 DF = 2/1137

Interlevel Statistics

Rural-Suburban-Urban Status	t for Equal Variance
Rural - Suburban	3.92**
Rural - Urban	.96
Suburban - Urban	3.55**

** Significant at .01 Level of Confidence

Checklist Clusters vs Grade Level

The analyses of variance of the Checklist Clusters are based on the long form of the Virginia Psycho-Motor Screening Instrument, not the shortened form appearing in Chapter 6.

The mean scores of the various Checklist Clusters generally do not vary from grade to grade. However, significant differences between third graders and the poorer scores of Kindergarten children on the cluster items labeled Internal Organization are noted. Refer to Table 73.

Table 73

ONE WAY ANALYSIS OF VARIANCE:
GRADE LEVEL VS CHECKLIST CLUSTER I - INTERNAL ORGANIZATION

Independent- Grade Level
Dependent- Checklist Cluster I
Grand Mean- 2.66
Total N- 907

Grade Level	Subjects	Mean	SD
Kindergarten	150	2.56	.67
1st	182	2.65	.73
2nd	207	2.70	.69
3rd	201	2.74	.63
4th	167	2.64	.72

SSB = 3.34 SSW = 425.95 F = 1.77 DF = 4/902

Table 73(continued)

Interlevel Statistics

Grade Level	t for Equal Variance
Kindergarten - 1st	1.17
Kindergarten - 2nd	1.96
Kindergarten - 3rd	2.66**
Kindergarten - 4th	1.08
1st - 2nd	.73
1st - 3rd	1.36
1st - 4th	.07
2nd - 3rd	.64
2nd - 4th	.79
3rd - 4th	1.42

** Significant at .01 Level of Confidence

The other exception to no difference from grade to grade occurs with the Checklist Cluster Vision. Fourth graders received significantly poorer scores than either second or third graders. Refer to Table 74.

Table 74

ONE WAY ANALYSIS OF VARIANCE:
GRADE LEVEL VS CHECKLIST CLUSTER III - VISION

Independent- Grade Level
Dependent- Checklist Cluster III

Grand Mean- 2.92
Total N- 1107

Grade Level	Subjects	Mean	SD
Kindergarten	164	2.91	.31
1st	227	2.91	.38
2nd	256	2.95	.29
3rd	247	2.95	.27
4th	213	2.84	.48

SSB = 1.78 SSW = 136.74 F = 3.58 DF = 4/1102

Table 74 (continued)

Interlevel Statistics

Grade Level	t for Equal Variance
Kindergarten - 1st	.01
Kindergarten - 2nd	1.34
Kindergarten - 3rd	1.37
Kindergarten - 4th	1.60
1st - 2nd	1.29
1st - 3rd	1.31
1st - 4th	1.68
2nd - 3rd	.01
2nd - 4th	3.02**
3rd - 4th	3.03**

** Significant at .01 Level of Confidence

Checklist Clusters vs Socio-Economic Status

Socio-Economic Status accounts for significant differences in two clusters - Internal Organization and Subdued Activity. Refer to Tables 75 and 76 . In both clusters children who were receiving free lunches scored more poorly than the children who entirely paid for their school lunches.

Table 75

ONE WAY ANALYSIS OF VARIANCE:
SOCIO-ECONOMIC STATUS (LUNCH STATUS) VS
CHECKLIST CLUSTER I - INTERNAL ORGANIZATION

Independent- Lunch Status
Dependent- Checklist Cluster I

Grand Mean- 2.69
Total N- 577

Lunch Status	Subjects	Mean	SD
Child Receives Free Lunch	110	2.50	.79
Child Partially Pays	12	2.83	.58
Child Pays Total	455	2.73	.61

SSB = 4.78 SSW = 243.96 F = 5.62 DF = 2/574

Interlevel Statistics

Lunch Status	t for Equal Variance
Free - Partially Pays	1.39
Free - Pays Total	3.25**
Partially Pays - Pays Total	.58

** Significant at .01 Level of Confidence

Table 76

ONE WAY ANALYSIS OF VARIANCE:
SOCIO-ECONOMIC STATUS (LUNCH STATUS) VS
CHECKLIST CLUSTER II - SUBDUED ACTIVITY

Independent- Lunch Status
Dependent- Checklist Cluster II

Grand Mean- 2.78
Total N- 659

Lunch Status	Subjects	Mean	SD
Child Receives Free Lunch	135	2.66	.75
Child Partially Pays	17	2.53	.87
Child Pays Total	507	2.82	.57

SSB = 4.78 SSW = 243.96 F = 5.62 DF = 2/574

Interlevel Statistics

Lunch Status	t for Equal Variance
Free - Partially Pays	.66
Free - Pays Total	2.67**
Partially Pays - Pays Total	2.01*

** Significant at .01 Level of Confidence
* Significant at .05 Level of Confidence

Checklist Clusters vs Sex

Boys exhibit significantly poorer scores than girls on the Checklist Clusters - Internal Organization, Overflow and Fine Motor Control. Refer to Tables 77, 78, 79.

Table 77

ONE WAY ANALYSIS OF VARIANCE:
SEX VS CHECKLIST CLUSTER I - INTERNAL ORGANIZATION

Independent- Sex
Dependent- Checklist Cluster I

Grand Mean- 2.66
Total N- 900

Sex	Subjects	Mean	SD
Male	431	2.56	.78
Female	469	2.76	.58

SSB = 8.89 SSW = 417.00 F = 19.15 DF = 1/898

Interlevel Statistics

Sex	t for Equal Variance
Male - Female	4.38**

** Significant at .01 Level of Confidence

Table 78

ONE WAY ANALYSIS OF VARIANCE:
SEX VS CHECKLIST CLUSTER IV - OVERFLOW

Independent- Sex
Dependent- Checklist Cluster IV

Grand Mean- 2.77
Total N- 877

Sex	Subjects	Mean	SD
Male	409	2.69	.71
Female	468	2.84	.52

SSB = 5.05 SSW = 333.91 F = 13.24 DF = 1/875

Interlevel Statistics

Sex	t for Equal Variance
Male - Female	3.64**

** Significant at .01 Level of Confidence

Table 79

ONE WAY ANALYSIS OF VARIANCE:
SEX VS CHECKLIST CLUSTER V - FINE MOTOR CONTROL

Independent- Sex
Dependent- Checklist Cluster V

Grand Mean- 2.90
Total N- 1019

Sex	Subjects	Mean	SD
Male	496	2.86	.48
Female	523	2.93	.31

SSB = 1.26 SSW = 163.91 F = 7.83 DF = 1/1017

Interlevel Statistics

Sex	t for Equal Variance
Male - Female	2.80**

** Significant at .01 Level of Confidence

Checklist Clusters vs Race

"White" children performed better than "Black" children with regards to Internal Organization and Vision (see Tables 80,81).

Table 80

ONE WAY ANALYSIS OF VARIANCE:
RACE VS CHECKLIST CLUSTER I - INTERNAL ORGANIZATION

Independent- Race
Dependent- Checklist Cluster I

Grand Mean- 2.66
Total N- 907

Race	Subjects	Mean	SD
White	673	2.71	.65
Black	234	2.54	.78

SSB = 4.94 SSW = 424.35 F = 10.53 DF = 1/905

Interlevel Statistics

Race	t for Equal Variance
White - Black	3.25**

** Significant at .01 Level of Confidence

Table 81

ONE WAY ANALYSIS OF VARIANCE:
RACE VS CHECKLIST CLUSTER III - VISION

Independent- Race
Dependent- Checklist Cluster III

Grand Mean- 2.92
Total N- 1107

Race	Subjects	Mean	SD
White	809	2.95	.30
Black	298	2.84	.46

SSB = 2.56 SSW = 135.96 F = 20.78 DF = 1/1105

Interlevel Statistics

Race	t for Equal Variance
White - Black	4.56**

** Significant at .01 Level of Confidence

Checklist Clusters vs Rural-Suburban-Urban Status

Urban children received scores significantly lower than rural and suburban children on the clusters - Internal Organization, Overflow, and Fine Motor Control.

Table 82

ONE WAY ANALYSIS OF VARIANCE:
RURAL-SUBURBAN-URBAN STATUS VS
CHECKLIST CLUSTER I - INTERNAL ORGANIZATION

Independent- R-S-U Status
Dependent- Checklist Cluster I

Grand Mean- 2.67
Total N- 892

Rural-Suburban-Urban Status	Subjects	Mean	SD
Rural	436	2.72	.63
Suburban	353	2.67	.69
Urban	103	2.46	.83

SSB = 5.79 SSW = 409.38 F = 6.29 DF = 2/889

Interlevel Statistics

Rural-Suburban-Urban Status	t for Equal Variance
Rural - Suburban	1.18
Rural - Urban	3.59**
Suburban - Urban	2.56*

** Significant at .01 Level of Confidence
* Significant at .05 Level of Confidence

Table 83

ONE WAY ANALYSIS OF VARIANCE:
RURAL-SUBURBAN-URBAN STATUS VS
CHECKLIST CLUSTER IV - OVERFLOW

Independent- R-S-U Status
Dependent- Checklist Cluster IV

Grand Mean- 2.78
Total N- 867

Rural-Suburban-Urban Status	Subjects	Mean	SD
Rural	427	2.80	.57
Suburban	347	2.80	.60
Urban	93	2.60	.79

SSB = 3.35 SSW = 319.64 F = 4.53 DF = 2/864

Interlevel Statistics

Rural-Suburban-Urban Status	t for Equal Variance
Rural - Suburban	.12
Rural - Urban	2.89**
Suburban - Urban	2.63**

** Significant at .01 Level of Confidence

Table 84

ONE WAY ANALYSIS OF VARIANCE:
RURAL-SUBURBAN-URBAN STATUS VS
CHECKLIST CLUSTER V - FINE MOTOR CONTROL

Independent- R-S-U Status
Dependent- Checklist Cluster V

Grand Mean- 2.90
Total N- 1010

Rural-Suburban-Urban Status	Subjects	Mean	SD
Rural	502	2.93	.32
Suburban	399	2.91	.39
Urban	109	2.74	.65

SSB = 3.35 SSW = 155.01 F = 10.87 DF = 2/1007

Interlevel Statistics

Rural-Suburban-Urban Status	t for Equal Variance
Rural - Suburban	.50
Rural - Urban	4.55**
Suburban - Urban	3.62**

** Significant at .01 Level of Confidence

Three Way Analysis of Variance

Whenever cell size permitted, three way analyses of variance were made involving the independent variables: grade level, socio-economic status, sex, race, and rural-suburban-urban status with the PPMS composite score, PPMS Clusters and Checklist Clusters.

When computing the three way analysis of variance involving socio-economic status, the category "Partially Paid" was combined with the category "Receives Free Lunch" because of the small number of subjects in the "Partially Paid" group.

Children enrolled in Special Education classes are not included in the analyses.

The only tables included are those in which significant relationships at the .01 level of confidence were obtained. However, interpretations regarding this data must be considered cautiously because of the frequently small number of subjects involved.

PPMS Composite Score

The F Tables 85 and 87 indicate the significant relationships influencing the PPMS composite score.

The main effects on the PPMS composite score appear due to grade (age), sex, and socio-economic status and may be seen in Tables 35, 39, 41. Significant interactions are observed in socio-economic status vs sex, and sex vs race.

Socio-economic status by sex is seen to have a special relationship with respect to PPMS composite score. Refer to Table 86. Of the

children who received free lunches, girls received lower scores than boys. Among the children who paid the entire amount, the girls received higher scores than the boys.

Table 85

F TABLE FOR THREE WAY ANALYSIS OF VARIANCE:
SOCIO-ECONOMIC STATUS VS SEX VS RURAL-SUBURBAN-URBAN STATUS
ON PPMS COMPOSITE SCORE

Source	SS	df	MS	F
Socio-Economic Status	.227	1	.227	17.22**
Sex	.002	1	.002	.12
Rural-Suburban-Urban	.063	2	.032	2.40
SES by Sex	.091	1	.091	6.88**
SES by R-S-U	.032	2	.016	1.21
Sex by R-S-U	.008	2	.004	.30
SES by Sex by R-S-U	.036	2	.018	1.35
N within Groups	8.873	672	.013	

** Significant at .01 Level of Confidence

Table 86

MEANS OF PPMS COMPOSITE SCORE:
SOCIO-ECONOMIC STATUS (LUNCH STATUS) VS SEX

Lunch Status	Male	Female
Free & Partially Pays	3.01 N=83	2.81 N=81
Pays Total	3.11 N=264	3.26 N=256

Sex and race are also related (see Table 88). Black females tended to have higher scores than males and white females.

Table 87

F TABLE FOR THREE WAY ANALYSIS OF VARIANCE:
GRADE VS SEX VS RACE ON PPMS COMPOSITE SCORE

Source	SS	df	MS	F
Grade	1.671	4	.418	72.39**
Sex	.151	1	.151	26.15**
Race	.035	1	.035	6.11
Grade by Sex	.055	4	.014	2.37
Grade by Race	.103	4	.003	.57
Sex by Race	.054	1	.054	9.39**
Grade by Sex by Race	.040	4	.010	1.75
N within Groups	6.191	1073	.006	

** Significant at .01 Level of Confidence

Table 88

MEANS OF PPMS COMPOSITE SCORE:
SEX VS RACE

Race	Male	Female
White	3.01 N=397	2.82 N=147
Black	3.08 N=396	3.10 N=153

PPMS Cluster I - Ocular Control

Analysis of the cluster, Ocular Control, did not reveal any interactions. The main effects are grade, socio-economic status, and sex. (Refer to Tables 53, 61, 65.)

PPMS Cluster II - Rhythmic Writing

The F Tables 89, 91, 93 verify that the main effects on Rhythmic Writing are grade, socio-economic status, and sex (see Tables 54, 62, 66) and that significant interactions exist: grade by rural-suburban-urban status, grade by socio-economic status, sex by race, and grade by sex by race.

Table 89

F TABLE FOR THREE WAY ANALYSIS OF VARIANCE:
GRADE VS RACE VS RURAL-SUBURBAN-URBAN STATUS
ON PPMS CLUSTER II - RHYTHMIC WRITING

Source	SS	df	MS	F
Grade	3.070	4	.767	27.25**
Race	.004	1	.004	.16
Rural-Suburban-Urban	.139	2	.069	2.46
Grade by Race	.107	4	.027	.95
Grade by R-S-U	.721	8	.090	3.20**
Race by R-S-U	.121	2	.061	2.15
Grade by Race by R-S-U	.339	8	.042	1.50
N within Groups	31.090	1104	.028	

** Significant at .01 Level of Confidence

Interactions involving grade and rural-suburban-urban status are noted (see Table 90). Urban Kindergarten children have the lowest scores while urban children in fourth grade have the highest scores.

Table 90

MEANS OF PPMS CLUSTER II - RHYTHMIC WRITING
GRADE VS RURAL-SUBURBAN-URBAN STATUS

R-S-U Status	K	1st	2nd	3rd	4th
Rural	2.49 N=59	2.79 N=157	2.77 N=108	3.25 N=128	3.12 N=113
Suburban	2.40 N=82	2.78 N=52	2.94 N=113	3.14 N=89	3.16 N=108
Urban	2.19 N=29	3.36 N=27	2.91 N=29	3.09 N=30	3.58 N=10

Significant interactions involving grade and socio-economic status are also observed (see Table 92). Kindergarten children who paid for their lunch did more poorly than Kindergarten children who received free lunch; however, children in grades three and four who paid for their lunch have the highest scores.

Table 91

F TABLE FOR THREE WAY ANALYSIS OF VARIANCE:
GRADE VS SOCIO-ECONOMIC STATUS VS RACE
ON PPMS CLUSTER II - RHYTHMIC WRITING

Source	SS	df	MS	F
Grade	1.447	4	.362	19.50**
Socio-Economic Status	.193	1	.193	10.39**
Race	.000	1	.000	.01
Grade by SES	.260	4	.065	3.50**
Grade by Race	.174	4	.044	2.34
SES by Race	.001	1	.001	.03
Grade by SES by Race	.101	4	.025	1.36
N within Groups	13.452	725	.019	

** Significant at .01 Level of Confidence

Table 92

MEANS OF PPMS CLUSTER II - RHYTHMIC WRITING
GRADE VS SOCIO-ECONOMIC STATUS (LUNCH STATUS)

Lunch Status	K	1st	2nd	3rd	4th
Free & Partially Pays	2.61 N=21	2.41 N=25	2.66 N=47	3.04 N=45	3.07 N=42
Pays Total	2.42 N=64	2.83 N=122	3.00 N=153	3.38 N=124	3.15 N=102

Further interactions are seen between sex and race. Black males did poorer than all others, but black females did better than all others (see Table 94).

Table 93

F TABLE FOR THREE WAY ANALYSIS OF VARIANCE:
GRADE VS SEX VS RACE ON PPMS CLUSTER II - RHYTHMIC WRITING

Source	SS	df	MS	F
Grade	1.559	4	.390	49.26**
Sex	.230	1	.230	29.04**
Race	.028	1	.028	3.59
Grade by Sex	.066	4	.017	2.09
Grade by Race	.075	4	.019	2.36
Sex by Race	.075	1	.075	9.46**
Grade by Sex by Race	.112	4	.028	3.53**
N within Groups	8.897	1124	.008	

** Significant at .01 Level of Confidence

Table 94

MEANS OF PPMS CLUSTER II - RHYTHMIC WRITING
SEX VS RACE

Sex	White	Black
Male	2.86 N=417	2.66 N=155
Female	2.95 N=413	3.00 N=159

Table 95 gives means and sample size which reveals that black Kindergarten males performed poorest, but that black females in grade three and white females in grade four performed best.

Table 95

MEANS OF PPMS CLUSTER II - RHYTHMIC WRITING
GRADE VS SEX VS RACE

Sex	Race	K	1st	2nd	3rd	4th
Male	White	2.42 N=58	2.90 N=85	2.78 N=89	3.09 N=96	3.12 N=89
	Black	1.94 N=22	2.53 N=32	2.76 N=38	3.16 N=34	2.93 N=29
Female	White	2.46 N=65	2.94 N=88	2.96 N=90	3.09 N=90	3.32 N=80
	Black	2.75 N=25	2.90 N=31	2.85 N=33	3.32 N=37	3.18 N=33

PPMS Cluster III - Balance

Table 96 reveals that the main effect on Balance is rural-suburban-urban status and that significant interactions of race and rural-suburban-urban status are seen. (See Table 97) Black suburban children and white urban children performed poorest. However, the best performances were among black children from rural and urban areas.

Table 96

F TABLE FOR THREE WAY ANALYSIS OF VARIANCE:
SEX VS RACE VS RURAL-SUBURBAN-URBAN STATUS
ON PPMS CLUSTER III - BALANCE

Source	SS	df	MS	F
Sex	.000	1	.000	.03
Race	.004	1	.004	.54
Rural-Suburban-Urban	.068	2	.034	5.15**
Sex by Race	.002	1	.002	.29
Sex by R-S-U	.011	2	.006	.87
Race by R-S-U	.101	2	.050	7.64**
Sex by Race by R-S-U	.009	2	.004	.67
N within Groups	7.221	1092	.007	

** Significant at .01 Level of Confidence

Table 97

MEANS OF PPMS CLUSTER III - BALANCE:
RACE VS RURAL-SUBURBAN-URBAN STATUS

Race	Rural	Suburban	Urban
White	3.28 N=340	3.26 N=395	3.18 N=74
Black	3.37 N=199	3.05 N=48	3.42 N=48

Table 98

ONE WAY ANALYSIS OF VARIANCE:
RURAL-SUBURBAN-URBAN STATUS VS PPMS CLUSTER III - BALANCE

Independent- R-S-U Status
Dependent- PPMS Cluster III

Grand Mean- 3.29
Total N- 1114

Rural-Suburban-Urban Status	Subjects	Mean	SD
Rural	549	3.32	.50
Suburban	443	3.24	.58
Urban	122	3.28	.63

Note.-- Based upon the total sample excluding children enrolled in Special Education classes.

PPMS Cluster IV - Visual Motor Control

The F Tables 99, 101,103 indicate the significance of grade and rural-suburban-urban status (see Tables 56, 70) and the interaction of grade by rural-suburban-urban status, grade by race, and sex by race.

Both grade and rural-suburban-urban status have an effect on Visual Motor Control. Suburban Kindergarten children and grade one urban children performed poorest. Both rural and urban scores decreased from grade three to grade four (see Table 100).

Table 99

F TABLE FOR THREE WAY ANALYSIS OF VARIANCE:
GRADE VS SEX VS RURAL-SUBURBAN-URBAN STATUS
ON PPMS CLUSTER IV - VISUAL MOTOR CONTROL

Source	SS	df	MS	F
Grade	2.169	4	.542	26.17**
Sex	.035	1	.035	1.69
Rural-Suburban-Urban	.269	2	.134	6.48**
Grade by Sex	.040	4	.010	.48
Grade by R-S-U	.508	8	.064	3.07**
Sex by R-S-U	.007	2	.004	.17
Grade by Sex by R-S-U	.042	8	.005	.25
N within Groups	21.200	1023	.021	

** Significant at .01 Level of Confidence

Table 100

MEANS OF PPMS CLUSTER IV - VISUAL MOTOR CONTROL
GRADE VS RURAL-SUBURBAN-URBAN STATUS

R-S-U Status	K	1st	2nd	3rd	4th
Rural	2.44 N=57	2.92 N=142	2.98 N=95	3.32 N=124	3.23 N=106
Suburban	2.27 N=77	2.77 N=50	2.78 N=103	2.91 N=83	3.07 N=102
Urban	2.57 N=27	2.29 N=20	2.94 N=29	3.15 N=28	3.02 N=10

Grade and race also interacted (see Table 102). Black Kindergarten children performed poorest, but black children in grades three and four have the best scores.

Table 101

F TABLE FOR THREE WAY ANALYSIS OF VARIANCE:
GRADE VS SOCIO-ECONOMIC STATUS VS RACE
ON PPMS CLUSTER IV - VISUAL MOTOR CONTROL

Source	SS	df	MS	F
Grade	2.485	4	.621	27.29**
Socio-Economic Status	.101	1	.101	4.43
Race	.000	1	.000	.01
Grade by SES	.112	4	.028	1.23
Grade by Race	.431	4	.108	4.73**
SES by Race	.003	1	.003	.13
Grade by SES by Race	.075	4	.019	.82
N within Groups	15.594	685	.023	

** Significant at .01 Level of Confidence

Table 102

MEANS OF PPMS CLUSTER IV - VISUAL MOTOR CONTROL
GRADE VS RACE

Race	K	1st	2nd	3rd	4th
White	2.43 N=69	2.82 N=104	2.90 N=147	3.02 N=125	3.07 N=116
Black	2.01 N=14	3.00 N=29	2.63 N=43	3.36 N=34	3.26 N=24

Sex and race differences are noted in Table 104. While black males did poorer than white males, black females did better than white females.

Table 103

F TABLE FOR THREE WAY ANALYSIS OF VARIANCE:
SEX VS RACE VS RURAL-SUBURBAN-URBAN STATUS
ON PPMS CLUSTER IV - VISUAL MOTOR CONTROL

Source	SS	df	MS	F
Sex	.038	1	.038	3.37
Race	.000	1	.000	.00
Rural-Suburban-Urban	.160	2	.080	7.09**
Sex by Race	.094	1	.094	8.34**
Sex by R-S-U	.014	2	.007	.60
Race by R-S-U	.014	2	.007	.61
Sex by Race by R-S-U	.019	2	.010	.86
N within Groups	11.752	1041	.011	

** Significant at .01 Level of Confidence

Table 104

MEANS OF PPMS CLUSTER IV - VISUAL MOTOR CONTROL:
SEX VS RACE

Sex	White	Black
Male	2.90 N=390	2.73 N=138
Female	2.83 N=385	3.02 N=140

PPMS Cluster V - Form Perception

No significant three way relationships are found.

PPMS Cluster VI - Differentiation

F Table 105 indicates the effects of grade, socio-economic status, and race on Differentiation. (See Tables 58, 63, 68.)

Table 105

F TABLE FOR THREE WAY ANALYSIS OF VARIANCE:
GRADE VS SOCIO-ECONOMIC STATUS VS RACE
ON PPMS CLUSTER VI - DIFFERENTIATION

Source	SS	df	MS	F
Grade	1.691	4	.423	22.91**
Socio-Economic Status	.264	1	.264	14.32**
Race	.179	1	.179	9.69**
Grade by SES	.051	4	.013	.69
Grade by Race	.329	4	.082	4.46**
SES by Race	.027	1	.027	1.45
Grade by SES by Race	.134	4	.034	1.82
N within Groups	13.085	709	.018	

** Significant at .01 Level of Confidence

Also significant is the interaction of grade and race (see Table 106). The lowest scores are from black Kindergarten children; the highest from grade four white children.

Table 106

MEANS OF PPMS CLUSTER VI - DIFFERENTIATION:
GRADE VS RACE

Race	K	1st	2nd	3rd	4th
White	2.35 N=69	2.65 N=116	2.73 N=149	2.99 N=132	3.27 N=116
Black	2.08 N=14	2.52 N=30	2.73 N=42	3.09 N=35	2.63 N=26

PPMS Cluster VII - Obstacle Course

F Tables 107,109,111 indicate the main effects related to grade and socio-economic status (see Tables 59, 64). Significant interactions are obtained concerning grade by socio-economic status, grade by race, and socio-economic status by rural-suburban-urban status.

Grade and socio-economic status differences are seen in Table 108. Kindergarten children who received free lunch or partially paid, received the lowest scores. Third grade children who entirely paid for their lunch received the highest scores.

Table 107

F TABLE FOR THREE WAY ANALYSIS OF VARIANCE:
GRADE VS SOCIO-ECONOMIC STATUS VS SEX
ON PPMS CLUSTER VII - OBSTACLE COURSE

Source	SS	df	MS	F
Grade	2.322	4	.581	12.96**
Socio-Economic Status	.950	1	.950	21.20**
Sex	.026	1	.026	.58
Grade by SES	.625	4	.156	3.49**
Grade by Sex	.186	4	.046	1.04
SES by Sex	.007	1	.007	.16
Grade by SES by Sex	.189	4	.047	1.05
N within Groups	32.161	718	.045	

** Significant at .01 Level of Confidence

Table 108

MEANS OF PPMS CLUSTER VII - OBSTACLE COURSE:
GRADE VS SOCIO-ECONOMIC STATUS (LUNCH STATUS)

Lunch Status	K	1st	2nd	3rd	4th
Free & Partially Pays	1.75 N=21	2.32 N=25	3.05 N=45	2.72 N=45	3.07 N=42
Pays Total	2.73 N=64	2.82 N=124	3.05 N=146	3.30 N=124	3.18 N=102

Grade and race are related in Table 110. Black Kindergarten children performed poorer than white Kindergarten children. However, black children in grades one through four did better than white children in grades one through four.

Table 109

F TABLE FOR THREE WAY ANALYSIS OF VARIANCE:
GRADE VS SOCIO-ECONOMIC STATUS VS RACE
ON PPMS CLUSTER VII - OBSTACLE COURSE

Source	SS	df	MS	F
Grade	3.372	4	.843	14.30**
Socio-Economic Status	.696	1	.696	11.81**
Race	.128	1	.128	2.18
Grade by SES	.255	4	.064	1.08
Grade by Race	.814	4	.204	3.45**
SES by Race	.172	1	.172	2.92
Grade by SES by Race	.091	4	.023	.39
N within Groups	42.918	728	.059	

** Significant at .01 Level of Confidence

Table 110

MEANS OF PPMS CLUSTER VII - OBSTACLE COURSE:
GRADE VS RACE

Race	K	1st	2nd	3rd	4th
White	2.43 N=71	2.48 N=118	2.91 N=153	2.84 N=134	3.05 N=118
Black	1.83 N=14	2.65 N=31	3.31 N=48	3.40 N=35	3.33 N=26

Table 112 lists data for socio-economic status and rural-suburban-urban status comparisons. Urban children who received free lunch or partially paid, have the lowest scores while urban children who paid for their lunch received the highest scores.

Table 111

F TABLE FOR THREE WAY ANALYSIS OF VARIANCE:
SOCIO-ECONOMIC STATUS VS SEX VS RURAL-SUBURBAN-URBAN STATUS
ON PPMS CLUSTER VII - OBSTACLE COURSE

Source	SS	df	MS	F
Socio-Economic Status	.835	1	.835	16.48**
Sex	.034	1	.034	.67
Rural-Suburban-Urban	.095	2	.047	.94
SES by Sex	.003	1	.003	.06
SES by R-S-U	.570	2	.285	5.62**
Sex by R-S-U	.047	2	.023	.46
SES by Sex by R-S-U	.005	2	.003	.05
N within Groups	35.774	706	.051	

** Significant at .01 Level of Confidence

Table 112

MEANS OF PPMS CLUSTER VII - OBSTACLE COURSE:
SOCIO-ECONOMIC STATUS (LUNCH STATUS) VS RURAL-SUBURBAN-URBAN STATUS

Lunch Status	Rural	Suburban	Urban
Free & Partially Pays	2.84 N=98	2.71 N=62	2.16 N=13
Pays Total	2.91 N=263	3.13 N=238	3.27 N=44

PPMS Cluster VIII - Kraus-Weber

F Tables 113,115 indicate that grade and race have significant effects on the Kraus-Weber (see Tables 60, 69). The F Tables also report that grade by race, and grade by socio-economic status by race are significantly interacting.

Comparing grade and race (see Table 114), it is noted that black Kindergarten children received the poorest scores and black and white children in third grade received the highest scores.

Table 113

F TABLE FOR THREE WAY ANALYSIS OF VARIANCE:
GRADE VS SEX VS RACE ON PPMS CLUSTER VIII - KRAUS-WEBER

Source	SS	df	MS	F
Grade	.678	4	.169	14.59**
Sex	.014	1	.014	1.19
Race	.336	1	.336	28.90**
Grade by Sex	.083	4	.021	1.78
Grade by Race	.159	4	.040	3.43**
Sex by Race	.003	1	.003	.24
Grade by Sex by Race	.052	4	.013	1.12
N within Groups	13.130	1130	.012	

** Significant at .01 Level of Confidence

Table 114

MEANS OF PPMS CLUSTER VIII - KRAUS-WEBER:
GRADE VS RACE

Race	K	1st	2nd	3rd	4th
White	3.48 N=123	3.51 N=175	3.66 N=180	3.76 N=187	3.66 N=169
Black	2.90 N=47	3.28 N=63	3.34 N=72	3.70 N=71	3.54 N=63

The comparison of grade, race and socio-economic status can be seen in Table 116 . The group that has the poorest average score is black, second grade children who entirely paid for their lunch. The highest scores come from black, third grade children who qualified for free or partially paid lunch.

Table 115

F TABLE FOR THREE WAY ANALYSIS OF VARIANCE:
GRADE VS SOCIO-ECONOMIC STATUS VS RACE
ON PPMS CLUSTER VIII - KRAUS-WEBER

Source	SS	df	MS	F
Grade	.596	4	.149	6.01**
Socio-Economic Status	.035	1	.035	1.42
Race	.092	1	.092	3.70
Grade by SES	.110	4	.027	1.10
Grade by Race	.073	4	.018	.73
SES by Race	.025	1	.025	1.01
Grade by SES by Race	.394	4	.098	3.97**
N within Groups	18.071	728	.025	

** Significant at .01 Level of Confidence

Table 116

MEANS OF PPMS CLUSTER VIII - KRAUS-WEBER:
GRADE VS RACE VS SOCIO-ECONOMIC STATUS (LUNCH STATUS)

Race	Lunch Status	K	1st	2nd	3rd	4th
White	Free & Partially Pays	3.38 N=13	3.69 N=16	3.40 N=20	3.82 N=27	3.75 N=24
	Pays Total	3.41 N=58	3.48 N=102	3.62 N=133	3.73 N=107	3.72 N=94
Black	Free & Partially Pays	3.25 N=8	3.22 N=9	3.74 N=27	3.94 N=18	3.56 N=18
	Pays Total	3.17 N=6	3.73 N=22	2.90 N=21	3.76 N=17	3.38 N=8

Checklist Cluster I - Internal Organization

F Table 117 indicates that the main effects on Internal Organization are sex, race and rural-suburban-urban status (see Tables 77,80,82). Table 117 also indicates a significant interaction with race and rural-suburban-urban status. Data in Table 118 reveals that black children in suburban and urban areas received the lowest scores while white children in suburban areas and white and black children in rural areas received the highest scores.

Table 117

F TABLE FOR THREE WAY ANALYSIS OF VARIANCE:
SEX VS RACE VS RURAL-SUBURBAN-URBAN STATUS
ON CHECKLIST CLUSTER I - INTERNAL ORGANIZATION

Source	SS	df	MS	F
Sex	.74	1	.174	13.59**
Race	.199	1	.199	15.58**
Rural-Suburban-Urban	.219	2	.110	8.58**
Sex by Race	.009	1	.009	.74
Sex by R-S-U	.013	2	.006	.49
Race by R-S-U	.181	2	.091	7.10**
Sex by Race by R-S-U	.017	2	.008	.66
N within Groups	11.149	873	.013	

** Significant at .01 Level of Confidence

Table 118

MEANS OF CHECKLIST CLUSTER I - INTERNAL ORGANIZATION
RACE VS RURAL-SUBURBAN-URBAN STATUS

Race	Rural	Suburban	Urban
White	2.73 N=276	2.71 N=321	2.51 N=63
Black	2.69 N=153	2.11 N=32	2.37 N=40

Checklist Cluster II - Subdued Activity

This cluster appears independent with no significant three way interactions.

Checklist Cluster III - Vision

F Table 119 indicates the source of significant effects on Vision, ie. grade, race, and grade by race. Refer to Table 74 regarding grade, and Table 81 concerning race.

Table 119

F TABLE FOR THREE WAY ANALYSIS OF VARIANCE:
GRADE VS SEX VS RACE ON CHECKLIST CLUSTER III - VISION

Source	SS	df	MS	F
Grade	.068	4	.017	5.90**
Sex	.000	1	.000	.14
Race	.073	1	.073	25.43**
Grade by Sex	.019	4	.005	1.64
Grade by Race	.069	4	.017	5.98**
Sex by Race	.004	1	.004	1.37
Grade by Sex by Race	.011	4	.003	.98
N within Groups	3.096	1077	.003	

** Significant at .01 Level of Confidence

Data regarding the relationship of grade and race is found in Table 120. White children received fairly even scores through the grades with a slight drop in grade one and grade four. Black children received scores essentially the same as white children in grades one, two and three but markedly poorer scores in Kindergarten and grade four.

Table 120

MEANS OF CHECKLIST CLUSTER III - VISION:
GRADE VS RACE

Race	K	1st	2nd	3rd	4th
White	2.98 N=119	2.90 N=169	2.98 N=178	2.94 N=178	2.90 N=158
Black	2.70 N=45	2.91 N=58	2.86 N=68	2.96 N=69	2.68 N=55

Checklist Cluster IV - Overflow

F Table 121 indicates the significance of sex (see Table 78) and the interaction of grade and race (see Table 122). F Table 123 points out the significant interaction of grade by socio-economic status and grade by race.

Refer to Table 122 for mean data regarding the interaction of grade by race on items of the cluster Overflow. Black children scored low in Kindergarten and grade two, but high in grades one, three and four. White children exhibit a gradual increase in scores with a slight

decrease at grade four.

Table 121

F TABLE FOR THREE WAY ANALYSIS OF VARIANCE:
GRADE VS SEX VS RACE ON CHECKLIST CLUSTER IV - OVERFLOW

Source	SS	df	MS	F
Grade	.122	4	.031	2.69
Sex	.123	1	.123	10.80**
Race	.022	1	.022	1.93
Grade by Sex	.044	4	.011	.96
Grade by Race	.167	4	.042	3.66**
Sex by Race	.002	1	.002	.18
Grade by Sex by Race	.061	4	.015	1.33
N within Groups	9.764	857	.011	

** Significant at .01 Level of Confidence

Table 122

MEANS OF CHECKLIST CLUSTER IV - OVERFLOW:
GRADE VS RACE

Race	K	1st	2nd	3rd	4th
White	2.68 N=96	2.78 N=139	2.83 N=133	2.85 N=145	2.74 N=129
Black	2.64 N=34	2.86 N=50	2.43 N=55	2.76 N=57	2.85 N=39

Table 123 of F values indicates significant interactions of grade by race and grade by socio-economic status.

When Table 124 regarding grade by race, is compared with Table 122, it is noted that the samples are somewhat different. Although scores of black children in grade four drop, the remainder of the data remain similar. Thus white children exhibit a steady increase in scores with a slight decrease in grade four and black children reveal the same pattern as before, ie. low in Kindergarten, high in grade one, low in grade two, and high in grade three.

Table 123

F TABLE FOR THREE WAY ANALYSIS OF VARIANCE:
GRADE VS SOCIO-ECONOMIC STATUS VS RACE
ON CHECKLIST CLUSTER IV - OVERFLOW

Source	SS	df	MS	F
Grade	.172	4	.043	1.47
Socio-Economic Status	.031	1	.031	1.04
Race	.045	1	.045	1.52
Grade by SES	.541	4	.135	4.63**
Grade by Race	.409	4	.102	3.49**
SES by Race	.187	1	.187	6.40
Grade by SES by Race	.136	4	.034	1.16
N within Groups	16.004	547	.029	

** Significant at .01 Level of Confidence

Table 124

MEANS OF CHECKLIST CLUSTER IV - OVERFLOW:
GRADE VS RACE

Race	K	1st	2nd	3rd	4th
White	2.55 N=55	2.64 N=91	2.83 N=111	2.82 N=103	2.79 N=88
Black	2.68 N=10	2.89 N=26	2.30 N=35	2.80 N=29	2.50 N=19

See Table 125 for data concerning the interaction of grade and socio-economic status on Overflow. Low scores occur among children who paid for their lunch and were enrolled in grades two and four. High scores occur among children who paid for their lunch in grades one and three and among fourth graders partially paying or receiving free lunch.

Table 125

MEANS OF CHECKLIST CLUSTER IV - OVERFLOW:
GRADE VS SOCIO-ECONOMIC STATUS (LUNCH STATUS)

Lunch Status	K	1st	2nd	3rd	4th
Free & Partially Pays	2.67 N=14	2.63 N=20	2.67 N=30	2.67 N=30	2.95 N=34
Pays Total	2.56 N=51	2.90 N=97	2.46 N=116	2.94 N=102	2.34 N=73

Checklist Cluster V - Fine Motor Control

F Table 126 indicates the significant effect of rural-suburban-urban status on the cluster, Fine Motor Control (see Table 84) and the interaction of socio-economic status and rural-suburban-urban status.

Table 126

F TABLE FOR THREE WAY ANALYSIS OF VARIANCE:
SOCIO-ECONOMIC STATUS VS SEX VS RURAL-SUBURBAN-URBAN STATUS
ON CHECKLIST CLUSTER V - FINE MOTOR CONTROL

Source	SS	df	MS	F
Socio-Economic Status	.041	1	.041	5.36
Sex	.005	1	.005	.68
Rural-Suburban-Urban	.163	2	.081	10.64**
SES by Sex	.003	1	.003	.38
SES by R-S-U	.074	2	.037	4.82**
Sex by R-S-U	.001	2	.000	.04
SES by Sex by R-S-U	.007	2	.003	.43
N within Groups	4.755	622	.008	

** Significant at .01 Level of Confidence

Table 127 displays the data regarding the interaction of socio-economic status and rural-suburban-urban status. The highest scores come from children in rural areas regardless of socio-economic status. The lowest scores come from children who partially pay or receive free lunch and who reside in urban areas.

Table 127

MEANS OF CHECKLIST CLUSTER V - FINE MOTOR CONTROL:
SOCIO-ECONOMIC STATUS (LUNCH STATUS) VS RURAL-SUBURBAN-URBAN STATUS

Lunch Status	Rural	Suburban	Urban
Free & Partially Pays	2.94 N=83	2.88 N=54	2.50 N=12
Pays Total	2.92 N=235	2.91 N=212	2.83 N=38

F Table 128 indicates the significance of the grade and socio-economic status interaction (see Table 129). The lowest mean scores come from grade three children who partially pay or receive free lunch; however, the highest mean scores come from children in the same socio-economic category but in grades one and two.

Table 128

F TABLE FOR THREE WAY ANALYSIS OF VARIANCE:
GRADE VS SOCIO-ECONOMIC STATUS VS SEX
ON CHECKLIST CLUSTER V - FINE MOTOR CONTROL

Source	SS	df	MS	F
Grade	.073	4	.018	2.42
Socio-Economic Status	.000	1	.000	.01
Sex	.013	1	.013	1.70
Grade by SES	.103	4	.026	3.44**
Grade by Sex	.013	4	.003	.44
SES by Sex	.005	1	.005	.70
Grade by SES by Sex	.014	4	.003	.45
N within Groups	4.753	632	.008	

** Significant at .01 Level of Confidence

Table 129

MEANS OF CHECKLIST CLUSTER V - FINE MOTOR CONTROL:
GRADE VS SOCIO-ECONOMIC STATUS (LUNCH STATUS)

Lunch Status	K	1st	2nd	3rd	4th
Free & Partially Pays	2.88 N=21	2.99 N=17	2.99 N=38	2.68 N=37	2.95 N=40
Pays Total	2.78 N=56	2.93 N=106	2.90 N=131	2.96 N=116	2.90 N=90

CHAPTER 8

DISCUSSION AND RECOMMENDATIONS

The study has yielded considerable information about the nature of the psycho-motor domain, data regarding instruments of measurement, and incidence figures for the school population of Virginia. The study has verified the reliability and construct validity of the principal psycho-motor measurement instrument, the Purdue Perceptual-Motor Survey. This Survey is able to assess performance in eight separate areas of psycho-motor functioning.

Also, the study has yielded a second instrument for measurement and investigation of the psycho-motor domain, the Virginia Psycho-Motor Screening Instrument. This Checklist has also proven to be a highly reliable instrument which permits the teacher with little more than a few introductory paragraphs to respond to twenty-three questions which complete an inventory of behavioral characteristics. These behavioral characteristics are associated with five different psycho-motor functions. The original intent of the Checklist was to provide a teacher checklist which would screen for suspected psycho-motor deficiencies. While the Checklist does well in identifying areas of psycho-motor deficits, it has revealed what appears to be five psycho-motor characteristics independent from the eight factors which appear on the PPMS. It is, in fact, believed that the behaviors identified on the Virginia Psycho-Motor Screening Instrument represent more complex interactions of many of the psycho-motor clusters revealed in the Purdue Perceptual-Motor Survey and with addition-

al factors including some of the items of the Test of Non-Verbal Auditory Discrimination. These interactions are not only with each other but with variables lying outside the psycho-motor domain proper. An additional and important by-product of the Checklist is the opportunity it gives to teachers to become more aware of task related psycho-motor behavior.

The Test of Non-Verbal Auditory Discrimination was not evaluated as thoroughly as the other instruments primarily because of insufficient data across the entire sample. The desirability remains of including auditory components of the psycho-motor processes in any assessment study. The value of the TENVAD and its subtests has not been fully explored.

The study has revealed a wide range of deficiencies in psycho-motor functioning in all grade levels examined. As expected, incidence of these deficiencies was greatest among the Special Education group, regardless of age, and primary school children. As age and grade level increased, incidence of psycho-motor deficiencies decreased. However, the continued decrease in the percentages of psycho-motor deficiencies was generally not observed in grade four, and in fact, some upward trends were noted. Such a pattern may very well indicate that for a large number of children, continued improvement of psycho-motor skills will not occur without intervention. In Kindergarten, the percentage of children failing one or more psycho-motor skill areas was 53%; in the fourth grade this number was 44%. The significance of the problem is evident when 17% of the fourth grade children had deficit scores on Ocular Control and

15% were deficient in Visual Motor Control - two areas alone which can easily affect efficiency in reading and writing.

The large percentages of deficits which persisted, suggest that continued attention be given to psycho-motor abilities through grade four. Any notion that attention to the development of psycho-motor skills be limited to pre-school or Kindergarten children would be a serious error.

The need to incorporate psycho-motor skills into the curriculum is apparent when large numbers of children receive failing scores among several psycho-motor clusters. A curriculum which provided for the development of known processes of psycho-motor function would best meet the needs of the majority of children and would also be in agreement with the concept of the developmental nature of psycho-motor skills and that the acquisition of these skills may be facilitated by appropriate learning experiences.

When regarding a psycho-motor curriculum, it is essential that the functions and processes about which we are concerned are integrated into other areas of the curriculum and in behavior. The moderate correlations that were achieved between the Purdue Perceptual-Motor Survey and the Experimental Edition of the Checklist, reflect the complexity of the psycho-motor domain and the need to integrate these skills with all aspects of the environment. The presence of various psycho-motor abilities alone is no assurance that the child has learned to integrate and use the skills in functional situations.

The "Standards of Quality and Objectives for Public Schools in Vir-

ginia" as enacted by the General Assembly of Virginia, 1972, has stated that all school divisions will provide for Kindergarten instruction. Concurrently, a review of Kindergarten curriculum is underway. It is recommended that the psycho-motor factors identified in this study be incorporated into that curriculum.

Several schools in the state are involved in the development of physical education programs which include an emphasis upon psycho-motor processes. As with the Kindergarten and in view of the findings of this study, a review of the physical education curriculum is in order.

A number of significant relationships were found when analyzing the data with one and three way analyses of variance. Since only significant relationships were included in Chapter 7, a review of that chapter summarizes the findings. While several interesting relationships were observed, some of the conclusions may be questioned because of the small number of subjects involved.

Regardless of the many significant relationships identified, the primary conclusions of this report remain intact, that is, large numbers of psycho-motor deficiencies exist among the school population sampled, and that grade (age), sex, and socio-economic status produced the main effects on PPMS composite score. For example, older children performed better than the younger, girls performed better than boys, and children from higher socio-economic families performed better than those from lower socio-economic strata.

Since the various clusters of the PPMS and Checklist were measuring different psycho-motor components, expected differences in the signifi-

cant relationships of each cluster to factors such as age, sex, race, socio-economic status, population density, did occur. These differences make it difficult and even unwise to draw general conclusions based upon total or composite scores. Similarly, it appears unwise to establish cut-off scores based upon total psycho-motor scores for the purpose of determining psycho-motor adequacy. This is particularly true when the concern is a remedial one, i.e. a child who failed to acquire adequate skill in one or more psycho-motor areas, beyond the time in which it might be expected to appear. Since most assessment measures and particularly screening instruments are designed to function with cut-off scores or other quantitative considerations based on total test performance, many children exhibiting need would be passed over. This is a particularly serious consideration since one or more areas of deficiency may be of no problem to one child because of any number of reasons, yet may result in major disruptions and complications in another child.

In order to more adequately assess individual need, profile analysis is desirable. Therefore, in the course of this study, provisions have been made that make it possible to retrieve data by individual subject and/or all individuals exhibiting a specific profile. Data recorded included all individual identifying information, (independent variables including the name of the child's school) and an evaluation of performance on the PPMS and Checklist clusters. Cluster performance was noted one of three ways: a plus (+) if a cluster score was 2.50 or better; a minus (-) if the cluster score indicated a deficit performance of 2.49

or less; and an (R) if the items included in a particular cluster yielded an unusual distribution. Furthermore, in the case of an "R" notation, all items in that cluster and the individual score of each item can be retrieved and re-examined.

The value of this procedure can be seen in the case of child #0058. This boy received a profile which indicated that he had a failing score only on the PPMS cluster, Visual Motor Control, but a questionable distribution on the PPMS cluster, Form Perception. The Checklist revealed only one cluster with questionable distribution of responses, Cluster I, Internal Organization. All other clusters were scored plus. On the basis of the total scores alone or on the basis of failing cluster scores alone, this child's responses would not be singled out. However, the presence of questionable patterns resulted in the retrieval of the child's test profiles and specific responses regarding each item included in the questionable distributions. Analysis of this additional information revealed the lowest failing score on the PPMS item, Form Perception, and indicated distortion in reproduction, but the best score possible on the item assessing organization of those forms on the paper. Of the four items failed in the Internal Organization cluster, three indicated difficulty in copying. It was therefore, determined that this child consistently had difficuly with visual-motor reproduction of form.

On the basis of this study there appear three major areas of concern which require further attention.

The first of these concerns is teacher education and the need to provide awareness of the psycho-motor skill areas. Since the teacher re-

mains the key figure in the effective implementation of any curriculum objectives, it is essential that she understand and be sensitive to the psycho-motor components of classroom performance and behavior.

The second of these concerns is an expansion of existing curriculum which will focus upon recognizable psycho-motor areas and encourage the integration of these skills into the entire curriculum.

The third area of concern is further development of assessment and screening measures and subsequent investigation regarding the nature of psycho-motor skills and their effects on behavior and academic performance.

These recommendations (1) teacher education geared toward awareness and development of psycho-motor functioning, (2) expansion of curriculum to include psycho-motor objectives, and (3) further development of test instruments and investigation of the psycho-motor domain, have been ranked in order of their immediate, practical implications. It should be noted that it may be possible to proceed with all three objectives simultaneously, which might prove to be ultimately more economical.

Teacher Education and Curriculum Expansion

Because of the developmental nature of psycho-motor skills and because of the obvious need, it is recommended that the target group be Kindergarten, grade one and grade two teachers and other teachers working with these groups. Several schools should be involved representing various socio-economic strata and race representation. Very early in the fall, the teachers should be exposed to a series of seminars and practicums re-

lating to psycho-motor development, significance, and assessment. The primary objective of the sessions should be to develop the teachers' observational skills and sensitivity toward psycho-motor processes, and how to effectively intervene when deficiencies are noted. Initial sessions could be presented to large groups, but it is essential that further sessions be comprised of only two or three teachers and be scheduled no less than twice monthly through December. These sessions are to be working sessions with children, both in and out of the classroom. As the sessions progress, key individuals should be identified for the future training of other teachers.

The effectiveness of the in-service program can be measured by assessing teacher attitudes and psycho-motor changes which have occurred by spring. A state wide control sample is recommended.

Simultaneous to the in-service program is the curriculum expansion phase. Beginning with existing curriculum it will be necessary to develop guidelines and activities that carry into the content areas of the various grades. The teachers may also begin to serve as resource people for further expansion of curriculum.

Further Development of Assessment Measures

Further development of assessment measures and investigation of the psycho-motor domain can best proceed by critical analysis of data already received. Such analysis would involve the clinical study of individual profiles. Additional data from cumulative record files may provide important information regarding achievement profiles, teacher evaluations,

and grades. It is recommended that measures of affect also be obtained for analysizing purposes, but this would require a new sample.

By clinically studying the psycho-motor patterns along with academic achievement, behavior and affective responses, a more adequate picture of the psycho-motor domain can be obtained. Similarly, it should then be possible to determine relative significance of the psycho-motor factors.

APPENDIX A

MEMORANDUM OF AGREEMENT

THIS AGREEMENT, made and entered into this 8th day of December, A.D. 1971, by and between GLEN HAVEN ACHIEVEMENT CAMP ASSOCIATION, a Colorado not-for-profit corporation, hereinafter referred to as the first party, and the VIRGINIA DEPARTMENT OF EDUCATION, hereinafter referred to as second party, WITNESSETH:

First party agrees to perform certain services for second party, as hereinafter described, and second party agrees to retain first party upon the furnishing of the said services, all upon the terms and conditions hereinafter set out:

1. SERVICES TO BE PERFORMED BY FIRST PARTY: The first party shall conduct and present to the second party a study of the psychomotor status of a mutually agreed upon sample of children in kindergarten through grade four in the State of Virginia. Such study will include methods for selecting, combining, and developing evaluation measures, which shall be verified statistically by analyses of data collected from a stratified sample of approximately 4,500 children for an initial screening in the form of a teacher checklist. An additional sample of approximately 1,500 children shall be taken to procure additional data in response to pupil test programs to be administered under the direction of the party of the first part. The samples shall be drawn from schools selected by the Virginia Task Force for Psychomotor Assessment and the Division of Educational Research and Statistics of the Virginia State Department of Education.

Based on the statistical analysis of the research data a report will be submitted which delineates the need for psycho-motor programming within the elementary schools of Virginia. The report will draw inferences for educational planning in terms of teacher education, instructional practices, classroom management, selection of curriculum materials, individualization of instruction, etc. The final report shall correlate findings of psychomotor study with findings of the cognitive needs assessment and with the standards of quality recently approved by the Virginia State Board of Education. The proposal submitted by first party in this connection is attached hereto, marked Exhibit A, and made a part hereof by reference.

2. PAYMENT: The second party shall pay to first party for the preparation of said study, the total sum of $65,000.00 payable as follows:

a. The sum of $20,000.00 Cash in hand paid upon the execution of this contract, receipt of which is hereby acknowledged.

b. The further sum of $5,000.00 on January 1, 1972, and on the first day of each month thereafter until August 1, 1972.

c. The balance upon receipt by second party of a final draft of the completed study provided for herein.

d. In the event first party incurs unexpected or unusual expenses, first party may submit to second party, on or before August 31, 1972, an itemized list of such expenses and the reasons for which they were incurred. If second party agrees that the said expenses are unusual and unexpected, but necessary to the successful completion of the study, the first party shall

be entitled to reimbursement for them. Reimbursement for such expenses shall not, however, exceed the sum of $5,000.00.

3. Although the proposal referred to above and incorporated herein as Exhibit A speaks in terms of a two phase study, it is understood and agreed by and between the parties that any continuing or supplemental study to be made after the expiration date of this contract is a separate transaction which may or may not be negotiated between the parties at a future date, and as the subject of a separate contract. This contract does not bind either of the parties to such a continuing or supplemental study.

4. STATUS REPORTS: On January 1, 1972, and at intervals of not more than monthly thereafter, first party shall submit written status reports to the Virginia Task Force for Psychomotor Assessment reporting on the progress of the project. In addition first party shall consult with the said Virginia Task Force for Psychomotor Assessment from time to time as necessary regarding the content of the study.

5. RELATIONSHIP OF THE PARTIES: First party shall at all times hereunder be regarded as an independent contractor, and this agreement shall not create an employer-employee relationship between the parties, or between either of the parties and any of the employees of the other. First party shall at all times hereunder be responsible for procuring and purchasing all materials in the services used in the study.

6. PUBLICATION EXPENSE: Costs of printing the final re-

port shall be borne by second party, but it shall be first party's obligation to supply to second party a clean, typed manuscript copy for submission to the printer.

7. COMPLETION DATE: The first party shall submit the completed study to second party on or before August 31, 1972, subject only to acts of God and causes beyond the control of the first party.

8. ASSIGNABILITY: This contract is personal to the parties, and neither of them shall be permitted to assign any rights or liabilities hereunder without the specific written request of the other, except as required by the 1971 Administrative Manual for the State Plans Programs issued by USOE.

IN WITNESS WHEREOF, the parties have caused this instrument to be executed as of the day and year first above written.

VIRGINIA DEPARTMENT OF EDUCATION

By_____

GLEN HAVEN ACHIEVEMENT CAMP ASSOCIATION

By_____
President

ATTEST:

_____
Secretary

EXHIBIT A

PROPOSAL FOR ASSESSMENT OF EDUCATIONAL NEEDS IN THE PSYCHO-MOTOR DOMAIN AMONG CHILDREN IN THE STATE OF VIRGINIA

In its statewide educational needs assessment program, the state of Virginia has organized a task force to coordinate assessing the needs of elementary school children within the psycho-motor domain. Such assessment involves the definition of "psycho-motor domain", development of measures for screening and evaluating the children, the determination of the incidence of psycho-motor problems among Virginia children, and the drawing of educational inferences from the information gathered.

Both the magnitude and nature of the above objectives suggest the desirability and need of establishing two consecutive projects or phases of study.

The first phase shall concern itself with the definition of "psycho-motor domain", the development of an efficient and systematic means of screening and evaluating children with psycho-motor problems, the determination of the incidence of psycho-motor problems, and the drawing of educationl inferences for the development of programs which reflect the needs of the children.

The second phase should aim at the development and implementation of actual programs and curriculum which take maximum advantage of the information gained in phase one and which, in fact, do meet the needs of Virginia children.

The following proposal outlines a project by the Glen Haven Achievement Center designed to fulfill the first phase of this problem for the state of Virginia. If the present project is successful, it is felt it would lead naturally into the second phase, the development of progressive and comprehensive educational programs to aid those children who display educationally related psycho-motor problems.

PROPOSAL OF SERVICES TO BE PROVIDED:

The Glen Haven Achievement Center will accomplish the following

I. Develop evaluation measures to be used in assessing the psycho-motor (P-M) status of Virginia (VA) elementary school children. These measures hereinafter referred to as the VA P-M Assessment Procedure, will include the following:
   A. Teacher Check List (TCL), developed for use as a screening instrument for the detection of suspected P-M problems.
   B. Intermediate Assessment Procedure, developed and used for detection of P-M problem among those children referred on the basis of the TCL.

II. Verify statistically and/or descriptively the reliability and validity of the VA P-M Assessment Procedures by the following methods:
   A. A pilot study will be conducted. Approximately 70 VA elementary students will be administered both the TCL and the Intermediate Assessment Procedures. The adequacy of

the TCL will be determined by the incidence of Type I and Type II errors noted (i.e. Type I: Children who, on the basis of their TCL score, would not have been referred for further testing and Type II: Children who were referred to the intermediate level but were found not to have P-M problems).

B. The validity of procedures used at the intermediate level of assessment will be substantiated on the basis of reported empirical data and authoritative endorsement.

III. Accumulate and statistically analyze the results of P-M Assessment Procedures employed with a stratified random sampling (ca 4500 for TCL and 1500 for Intermediate Assessment Procedures) of the VA elementary school children. Utilizing the geographic and demographic variables suggested by the task force (i.e. age, sex, race, SES, I.Q., Special Class membership, population density, and geographic location) data will be computed which reflect the incidence of P-M problems. Graphic illustrations will be provided to demonstrate incidence according to the suggested variables.

IV. Submit a report based on the statistical analysis of the research data which delineates the priority of needs for psycho-motor programming within the elementary schools of Virginia.

The report will draw inferences for education planning in terms of teacher education, instructional practices, classroom manage-

ment, selection of curriculum materials and individualization of instruction.

The final report shall correlate the findings of the pscho-motor study with the findings of the Virginia Educational Needs Assessment Study of the Cognitive and Affective Domain, and with the Standards of Quality recently approved by the State Board of Education in Virginia.

Glen Haven Achievement Center
Ft. Collins, Colorado

PROPOSED BUDGET

Personnel		
Project Supervisor (1/4 time)		$ 5,000.00
Project Director (full time)		10,000.00
Field Supervisor (3/4 time)		7,500.00
Secretary (3/4 time)		3,150.00
	FICA	1,250.00
Data Collection		
30 graduate students @ $24.00 a day for 10 days		7,200.00
Per diem @ $10.00 a day per student		3,000.00
One day training a team of 48 @ $24.00 per day per student		1,152.00
Teacher Check List Materials		550.00
Intermediate Assessment Materials		8,594.00
Data Analysis		2,500.00
Travel of Staff		5,780.40
Consultant Services		1,800.00
Miscellaneous Supplies		1,750.00
	Sub Total	$59,226.40
Indirect Cost (10% of Gross)		5,773.60
	GRAND TOTAL	$65,000.00

APPENDIX B

TEST SELECTION

TEST INSTRUMENTS REVIEWED

(1) Illinois Test of Psycholinguistic Abilities, Revised Edition, Kirk, McCarthy and Kirk, 1968.

(2) Marianne Frostig Developmental Test of Visual Perception, Third Edition, Frostig, 1966.

(3) The Primary Visual Motor Test, Haworth, 1970.

(4) Lincoln-Oseretsky Motor Development Test, Sloan, 1951.

(5) Purdue Perceptual-Motor Survey, Roach and Kephart, 1966.

(6) Southern California Perceptual-Motor Tests, Ayres, 1969.

(7) Goldman-Fristoe-Woodcock Test of Auditory Discrimination, Goldman, Fristoe and Woodcock, 1970.

(8) Test of Non-verbal Auditory Discrimination, Experimental Edition, Buktenica, 1968.

APPENDIX B

TEST SELECTION

REVIEW OF THE PPMS

EXERPTS FROM MENTAL MEASUREMENTS YEARBOOK, 1972

Daniel Landis states the following in his review of the PPMS:

(1) Though most tests of perceptual-motor abilities typically are developed without a theoretical base, "this reviewer is pleased to note that the designers of the PPMS have not followed the atheoretical trend. The PPMS is explicitly based on a well-developed, if unique, perceptual-motor theory. For this reason alone, I would be happy to commend this instrument."(p. 1285)

(2) The test lacks interpretation specific to resulting test scores thereby making it inappropriate for use by all but those well versed in the theoretical foundation.

(3) "Statistically, the PPMS is quite good...Although the item means show the expected increases over ages 6 to 10, the items variance remain, for all practical purposes, constant. This finding makes the test usable in a research context, as well as large scale evaluation programs." (p.1285)

(4) "...it is clear that this is a superior instrument which, in the interpretive hands of someone knowledgeable in perceptual dysfunction, could be useful in educational remediation." (p. 1285)

APPENDIX B

TEST SELECTION

PPMS NORMATIVE STUDY

Fifty subjects from each grade one through four were selected randomly after a criterion that eliminated those students with a previous history of motor defects was met. All of the participating students were performing academically at grade level. For the purpose of establishing validity and reliability measures, 97 non-achievers who were involved in programs at Purdue's Achievement Center were selected and matched according to grade level and age to participate as a clinic sample. The students from the normative sample were subjected to teacher ratings based on academic performance. A scale from 5 (superior) to 2 (low average) was used. The clinic sample was rated at 1 which indicated achievement at least one year below grade placement.

Socio-economic status was a factor that the authors felt might affect performance on the PPMS; so an index based on head of household's occupation was employed to sort the normative sample into six groups. Sex, a variable that might contribute to performance on the PPMS was accounted for in the study.

Reliability was measured by a test-retest correlation utilizing 30 subjects randomly selected from the normative sample. Also inter-rater reliability was measured. Though scoring values on the PPMS range from a high of 4 to a low of 1, Roach chose to dichotomize the performance criterion into pass (scores of 4 and 3) and fail (scores of 2 and 1). This was done to facilitate a Chi-square analysis which would reflect which tasks were most difficult for non-achievers and least difficult for achievers.

Results of the normative study revealed that there was typically a gradual increase in mean scores from the first grade up. Though a significant difference was noted between groups sorted into socio-economic status, this was not deemed conclusive. With regard to the sex variable, a higher mean score was attained by the male students (85.34) than by the female students (83.66), but this difference was not significant statistically.

In the validation phase when comparison for difference between achievers and non-achievers was measured using Chi-square, all values for the PPMS items were significant with the exception of developmental drawing - organization. Roach suggested that this subtest should be revised when used with intellectually capable subjects. The test-retest reliability measure yielded a coefficient of stability of .946. This was considered sufficient due to the fact that a week lapsed between test and retest and different examiners administered the test. The final form of the PPMS was modified based on the high intercorrelation between the items of the ocular pursuit subtest. Instead of twelve items in this subtest, the published form of the PPMS contains four items (ocular pursuit - both eyes, right eye, left eye and a convergence task was added). The relatively high intercorrelation between the subtest was expected by the authors since some of the subtests were designed to measure the same perceptual-motor pattern but in a different way.

A concurrent validity coefficient of .654 was obtained by a Pearson r coefficient of correlation between teacher ratings and the total PPMS utilizing both the normative sample of 200 and the clinical sample of 97.

In concluding the data analysis, the author indicated that teachers' ratings were effective as composite criterion. This credit might suggest an endorsement of the development of a perceptual-motor checklist that might be appropriate for teachers in the identification of potential learning problems.

APPENDIX B

TEST SELECTION

DESCRIPTION OF THE TENVAD TEST

The TENVAD was constructed for the purpose of assessing auditory discrimination in young children and is patterned after the model of the Seashore Test of Musical Talent (1960). It is non-verbal and intended to provide an auditory discrimination test that is fairly stable across socio-economic and racial lines. TENVAD is made up of 50 pairs of tones in five subtests - Pitch Test, Loudness Test, Rhythm Test, Duration Test, and Timbre Test, each having ten pairs of tones.

The following is a description of each of the subtests:

1. Pitch Test - This subtest is comprised of ten pairs of tones centering around 500 cycles per second each having a duration of 0.5 seconds, with 0.5 second pause between the paired tones, and an 8.0 second interval between pairs to allow for the subject to respond. Half of the pairs of tones are the same pitch and half are a different pitch. The tone pairs that are the same are 500 frequencies per second. All of the tones are recorded on tape at 50 decibels above the normal threshold with the order of same or different pairs distributed randomly. The pure tones were transcribed on tape with a Grissom-Stadler Electronic Switch, Model 829S165, Switch Signal, with a rise delay time of 10 milli-seconds. The monitored interval was with a Doven Volume Level Indicator (VO Meter) Type 9-19E. Control of intensity was by a Howlett-Packard Attenuator Set, Model 350B, and the oscillator used was Howlett-Packard Audio-Oscillator, Model 200AB.

2. Loudness Test - This subtest consists of ten pairs of tones that are different in loudness. The frequency is held constant at 440 cycles per second with each tone having a duration of 0.5 seconds, with 8.0 seconds between pairs. The source of the tones is the same as that of the Pitch Test. The difference in loudness for the pairs of tones that were different is 4.0 decibels and, of course, the pairs of the tones that are the same, have no difference in decibles.

3. Rhythm Test - Ten pairs of rhythm patterns were taken from the Seashore Test of Musical Talent. All the tones are at 500 cycles per second and the tempo is constant at 92 quarter tones per minute. The pairs of rhythm patterns are again separated by 8.0 seconds interval.

4. Duration Test - This subtest is comprised of ten pairs of tones of different duration. The source of the tones is the same as that for the Pitch Test and Loudness Test. The frequency of the tones is held constant at 440 cycles per second with 8.0 of a second between pairs of tones. The five pairs of tones having a difference in duration are different by 0.5 seconds.

5. Timbre Test - Ten pairs of tones in this subtest are different or the same in timbre. The individual pairs of tones were taken from the first ten pairs of the Timbre Test of the Seashore Test of Musical Talent. The tones were then separated by an 8.0 interval,as in the other subtests, so as to allow the children adequate time to mark their response on a scoring sheet.

N.A. Buktenica, 1968

APPENDIX C

DATA COLLECTION

PROJECT PERSONNEL

Name and Position	Project Responsibility
N.C. Kephart, Chairman, Board of Directors, Glen Haven Achievement Center	Project Supervisor
James M. Weddell, Acting Director, Glen Haven Achievement Center	Project Director
Michael Hanum, Assistant Professor of Special Education, Bowling Green State University	Field Supervisor
Clara M. Chaney, Coordinator of Child Services, Glen Haven Achievement Center	Assistant in Training of Field Study Personnel
Nancy R. Miles, Clinician, Glen Haven Achievement Center	Assistant in Training of Field Study Personnel
Margaret Noser, Clinical Assistant, Glen Haven Achievement Center	Clerical
Janenne Wall, Secretary, Glen Haven Achievement Center	Secretary
James K. Hoffmeister, Test Analysis and Development Corporation	Statistical Consultant
Members of the Virginia Task Force	

FIELD STUDY PERSONNEL

Barbara Allen
Johnson City, Tennessee

Jo Cleek
Johnson City, Tennessee

Sharon deFur
Williamsburg, Virginia

Jane L. Ellison
Blacksburg, Virginia

Rick Griffin
Williamsburg, Virginia

Richard Hudson Jr.
Blacksburg, Virginia

Nancy Lee
Fredericksburg, Virginia

Linda G. Leffel
Blacksburg, Virginia

Jean Leppington
Charlottesville, Virginia

Carolyn E. Lewis
Richmond, Virginia

Ann B. Madison
Norfolk, Virginia

Donna G. Massey
Charlottesville, Virginia

Tommie O'Donnell
Wise, Virginia

Bill Orr
Johnson City, Tennessee

Lon Z. Shuler
Kingsport, Tennessee

Juanita Wright
Richmond, Virginia

APPENDIX C

DATA COLLECTION

CORRESPONDENCE AND DIRECTIVES

Glen Haven Achievement Center
Post Office Box 2153
Fort Collins, Colorado 80521

NEWELL C. KEPHART, PH.D.
Director

March 1, 1972

TO: Participating Graduate Students

FROM: Glen Haven Achievement Center

SUBJECT: Virginia Project - DATA COLLECTION

As you probably know a special task force committee from the State Department of Education is coordinating a project to assess the psycho-motor needs of primary school children within the state. To accomplish this survey, it will be necessary to test 1500 children through the state with a specific psycho-motor diagnostic procedure. These children will be students in kindergarten through grade 4 which represent a stratified random sample. The Glen Haven Achievement Center of Fort Collins, Colorado is the primary consultant of the project. The Glen Haven Center will select approximately fifteen Virginia college students who will be trained in the testing procedure and will then administer the tests and gather the data needed.

Your name was recommended to us by a faculty member of your college. Specifically what we need are 12-15 college students that will team in groups of 2 or 3. Each individual will test 90-100 primary age students in geographic regions near their college. After the training period the college students should be able to test approximately 10 students per day.

From the end of the training period each college student will be allowed approximately three weeks (a definite date will be set later) in which to complete his testing and submit the data. All arrangements concerning testing sites will be made by the Glen Haven Achievement Center. The student will be provided with a list of the schools and the particular classes he is to visit in the data gathering period. The college student will be responsible only for arriving at the specified schools, testing the specified students, and submitting the test results by mail to the Glen Haven Achievement Center.

For each training and testing day the college student will be paid $24.00 plus travel, meals and lodging expenses. A total maximum figure is being determined for reimbursing milage expenses and will be arrived at by figuring a direct route from one school to another. Lodging expenses will be allotted for 10 nights away from your residence.

In addition to financial compensations, the college student will, if he wishes, receive two quarter hours graduate credit from the University of Northern Colorado, which may be transferred to the other colleges. This credit will be granted as a practicum in psycho-motor testing, under the supervision of Dr. N. C. Kephart.

The following requirements are necessary for particpation in the project:

1. You must be able to arrange your school schedule in order to be available for the three day training period, March 20, 21 and 22. The training will be held in the Roanoke or Richmond area, final details are forth coming. If the training site is located distant from your residence, over night accommodations will be provided. The cost of travel and meals will also be provided.

2. You must be able to spend approximately 10 full days testing in the public schools. This testing must be completed within a five week period beginning March 20, this includes public school holidays.

3. It will be necessary for you to provide your own transportation to the school sites. Since you will be working in teams of 2 or 3, only one auto may be required per team.

If you are interested in participating in this program, please respond as soon as possible. You may use the enclosed envelope if you wish. Also indicate if you can provide your own transportation. If you have questions you may call collect to 484-7270, area code 303.

It may not be possible to offer everyone who applies a position on the data gathering team. If you are accepted you will be immediately notified and asked to sign a letter of agreement. We will however, retain the option to terminate the services upon the completion of the 3 day training program. You would, of course, be reimbursed for your time and expenses to that time.

We hope to hear from you soon.

Cordially yours,

J. M. Weddell
Project Director

JMW:jw

Glen Haven Achievement Center
Post Office Box 2153
Fort Collins, Colorado 80521

NEWELL C. KEPHART, PH.D.
Director

March 15, 1972

Dear

We are pleased to accept your services and offer you a position on our data collection team.

The training session will be conducted in Petersburg, Virginia. Our first session is scheduled to begin at 8:30 a.m. Monday, March 20 at the Blandford Elementary school. The session will last until 5:00 p.m.

The second session on March 21 will probably be held in the same school and the session on March 22 will be held in a school in the Petersburg area. Final arrangements will be made Monday. We will want to meet at least one evening, likely, Tuesday, March 21.

Lodging and meals will be up to the individual. I and two other representatives of the Glen Haven Achievement Center will arrive Sunday evening, March 19 and will be staying at the Holiday Inn, downtown, corner of I-95 and Washington Street in Petersburg. Room rates are $11.00 per single and $18.00 per double. If you choose to stay at this motel, please indicate if you are with our group. There is a meeting room and we will use it for the 1 or 2 evening meetings.

We have enclosed a list of all the participants should you wish to form car pools and/or share lodging.

Each individual will be paid $24.00 per day plus $20.00 expenses per day ($15.00 food and lodging, $5.00 transporation). Upon the completion of the training session you will immediately receive the $24.00 plus $20.00 for each of the 3 days of the training session. If you are selected for the actual testing you will immediately receive the expense allowance for each of the remaining 10 days. Upon the completion of the testing and submission of the data you will be sent the balance of $24.00 per day.

You will be asked to sign an actual letter of agreement on Monday, March 20.

Enclosed you will also find an administration manual of the Purdue Perceptual-Motor Survey. Prior to your arrival Monday you will be expected to be familiar with this manual, particularly the administration and scoring of the items of the "Survey". Instructions regarding other test instruments, data collection, as well as experience with children, will be a part of the 3 day training session.

We expect all participants to be neat. The ladies may wear slacks, pant suits or coulottes.

We are looking forward to working with you.

Cordially yours,

J. M. Weddell
Project Director

JMW: jw
Enclosures (2)

Glen Haven Achievement Center
Post Office Box 2153
Fort Collins, Colorado 80521

NEWELL C. KEPHART, PH.D.
Director

March 17, 1972

TO: Principals and Teachers of participating schools

FROM: Glen Haven Achievement Center for the Virginia State Department of Education

SUBJECT: Psycho-Motor Domain Needs Assessment Study

As you are probably aware, Virginia is one of the first states to initiate a statewide educational needs assessment under the federal guidelines for Title III. The initial phase of this study, cognitive and affective domain needs assessment, was completed in the Spring of 1971. This study attained national prominence and is now being used to effect important changes in curriculum.

The Psycho-Motor Domain Needs Assessment may be regarded as a successive step in the evaluation of the needs of primary school children. This study is regarded as unique in its scope and its purpose. For this study your state department has asked the assistance of the Glen Haven Achievement Center.

Within the next five weeks a testing team will arrive at your school. The team will be composed of one to three people who have been trained in the evaluation procedures. These testers will be arranging their own schedules for visiting the schools. Every effort will be made to provide as much advance notice as possible concerning their arrival. If scheduling problems arise we believe that these can be worked out with the testing team.

In anticipation of the teams visit, the following items may be regarded:

1. As a part of the Virginia Psycho-Motor Assessment, the following class or classes from your school have been selected by your State Department of Education.

   1.

   2.

   3.

4.

5.

If there are several classes of the same grade, we prefer that you select the one that has the greater heterogeneity.

The testers who arrive at your school will require an alphabetical roster for each of the classes listed under #1. From each of these classes they will randomly select 10 children for testing.

2. Two kinds of testing will be required:

   a. Individual psycho-motor assessment of the 10 children. If more than one examiner arrives it is possible that 2 or 3 children can be evaluated simultaneously in the same room. This testing will require approximately 20 to 25 minutes per child.

   b. Group auditory perceptual testing of all 10 of the children simultaneously. This testing will require approximately 20 minutes.

3. Upon the selection of the children who will be tested, you will be provided with a record form listing their names. It will be necessary to record several pieces of information from the child's cumulative folder. This data includes birth date, IQ if available whether or not vision or hearing tests have been done this past school year, occupation of the head of the household and the number of school years he or she has completed.

4. The following facilities and equipment will be required:

   a. A classroom or similar space. A closed room is definitely preferred, although a corner of a gym or other large area may be made to work. However, it will be necessary to have a closed room for the auditory-perceptual testing.

   b. Equipment needed includes a chalkboard with eraser and chalk, 10 children's desks (for the group auditory testing), and unwarped 2"X4" board about 8 feet long, a yard stick or broom handle and a tape recorder.

   c. We recommend that the girls be dressed in slacks for the testing.

5. Several weeks from now you will be receiving a number of questionnaires (a teacher's check list). These questionnaires are to be distributed to the teachers of each of the previously identified classrooms. These teachers are being asked to complete one of

these questionnaires for <u>each</u> child in her classroom, not just the 10 tested. These questionnaires will be self explanatory. Upon the completion of these forms, we will ask you to return them to us post-paid by us.

We fully understand the time and inconvenience this study imposes upon you and your staff, but we share with your State Department the knowledge of the importance of this project for the future.

If you have any questions regarding this study, or problems arise, please feel free to contact me.

Cordially yours,

J. M. Weddell
Project Director
Virginia Assessment Study

Assistant Director
Glen Haven Achievement Center

JMW:jw

Glen Haven Achievement Center
Post Office Box 2153
Fort Collins, Colorado 80521

NEWELL C. KEPHART, PH.D.
Director

March 31, 1972

Mrs. Sara G. Irby
Coordinator, Special Education
Stafford County
Rt. 4 Box 51
Fredericksburg, Va. 22401

Dear Mrs. Irby:

Anne Tucker has indicated that you might be able to help us in gathering some auditory-perceptual data as a part of the Virginia Psycho-Motor Assessment project.

The students that we have trained to collect the data are prepared to administer perceptual-motor evaluations individually to each of ten children randomly selected from a classroom identified in the statewide sample. In addition, they have been asked to administer the Buktenica test of non-verbal auditory discrimination to the 10 children as a group. The Buktenica test is self contained; the instructions and the auditory stimuli are on a single reel tape. The children respond by marking in their own booklet.

Our pilot work and initial datum indicate that the students are unable to adequately administer this test to the children in the primary EMR classes, kindergarten and first grade. It is in these grades that we find it necessary to seek more adequately trained help. There seem to be several problems in testing the first graders, kindergarten and primary educable retarded, which require greater experience on the part of the examiner and more time for administration.

1. It is necessary to depart from the prepared instructions on the tape in order to assure that the children have the concept of the task.

2. Since the discriminations required are often quite minimal, the children's attention begin to wander. It is often necessary to stop the tape after every 2 or 3 items to re-locate the child on his record form.

3. Related to the above is the need to monitor the child's responses, since they often degenerate into patterned responses without regard to the auditory stimuli.

4. It was found desirable in a number of cases to divide the sample of 10 up into two groups of 5 and repeat the test.

While the tape runs for approximately 25 minutes the testing time can run for closer to an hour if time is required to clarify instructions and stop between test items. And, of course, if it is necessary to work with groups of 5 instead of 10, the time required to test ten children is again doubled.

We would appreciate your assistance in identifying people to administer this test in the primary educable retarded classes, kindergarten and first grades that are located in your district and are a part of the sample which has been identified by the State Department.

The actual 10 children that are tested from each class will be the 10 children which have received psycho-motor testing from the testing team. It will be necessary to supply you with a list as soon as it is available.

The number of classes involved in your district is 5: a kindergarten and primary EMR class at the Hugh Mercer school in Fredericksburg; a first grade class at the Robert E. Lee school in Spotsylvania; and a first grade and primary EMR class at the Stafford school in Stafford. If it appears that your personnel is able to assist us, I will provide you with specifics and test materials.

If you have any questions, please call or write to me. We appreciate any help you can be in this matter and are well aware of the inconvenience this imposes on you.

Cordially yours,

J. M. Weddell
Assistant Director

JMW:jw
cc: Miss Anne Tucker

Glen Haven Achievement Center
Post Office Box 2153
Fort Collins, Colorado 80521

NEWELL C. KEPHART, PH.D.
Director

MEMO

DATE: April 26, 1972

TO: Principals and Teachers of Participating Schools

FROM: Glen Haven Achievement Center for the Virginia State Department of Education

SUBJECT: Psycho-Motor Domain Needs Assessment Study

In our last letter dated March 17, we indicated that we would be mailing to you copies of the Virginia Psycho-Motor Screening Instrument (VPMSI). Within this envelope you should find VPMSI's for each of the teachers whose class participated in the study. There should be enough forms for the teachers to complete one form for each of the children in her room. If there are more children than forms provided, complete forms for the ten children in the initial sample and for as many children as there are forms remaining. We would like each teacher to return these forms by May 17. They may each use the addressed and stamped envelope which has been provided for each teacher. If a teacher has less than 30 children in her class, return the unused questionnaires in the envelope provided, along with the completed forms.

Instructions for responding to the VPMSI are on the cover page of the form; if you have any questions about these, please call the Glen Haven Achievement Center collect: Area Code 303 - 484-7270.

APPENDIX D

EVALUATION AND INFORMATION FORMS

VIRGINIA PSYCHO-MOTOR SCREENING INSTRUMENT
(EXPERIMENTAL EDITION)

VIRGINIA PSYCHO-MOTOR SCREENING INSTRUMENT – INSTRUCTIONS

Psycho-motor domain refers to the child's awareness and knowledge of himself, his movements, and his relationship to his environment. It includes reception and processing of data, generation, control and evaluation of his responses.

Purpose

To provide the classroom teacher with an instrument with which she may evaluate her students in the areas of psycho-motor development. By use of this assessment procedure the individual student's need for development in the psycho-motor areas may be determined.

The teacher check list will be used to refer those students (based on a criterion score specific to chronological ages) who are suspected of having developmental lags to a resource for more intensive diagnostic measuring.

Administration

The teacher, after being exposed to the students in her class for several weeks of the school year, should be able, in retrospect, to consider the performance behavior of the individual students. She should be able to respond, with a reasonable degree of accuracy, to the question on the VPMSI.

Scoring

A check (√) should be placed in the (+) column if the specific behavior of the question is applicable to the student being considered.

A check should be placed into the (0) column if the teacher cannot recall the student's behavior with reference to the question as stated or if she has not had an opportunity to observe this particular behavior.

A check should be place in the (–) column if the teacher feels reasonably certain that the child does not behave in the manner described in the question.

Please provide a narrative description of any inappropriate behaviors (related to the psycho-motor domain) not covered by questions in the VPMSI. These comments should be recorded on the back of the last page.

VIRGINIA PSYCHO-MOTOR SCREENING INSTRUMENT

Student's Name _____ Grade _____

School _____ Age _____

	+	0	−
1. Does he seek support when standing (eg. lean against the blackboard, desk, teacher)?			
2. Is he clumsy (eg. may trip or bump into things often)?			
3. Does he often seem uncomfortable at his desk (eg. he may wrap his legs around the chair for support or frequently move excessively while working at his desk)?			
4. Does he avoid participating in motor activities (eg. he will not play games during recess, or prefers to stand and watch)?			
5. Does he seem withdrawn, shy, or unusually inactive?			
6. Does his body move from side to side in writing task (either in the seat or at the blackboard)?			
7. When writing, does he often wrinkle his paper, tear it with his pencil, or is his paper usually messy and smudged?			
8. Does he move his paper too far to one side of the desk when writing or drawing?			
9. Does he write or draw without stabilizing the paper with his free hand?			
10. Does he use an excessive amount of paper when writing or drawing (eg. he may start an assignment over many times)?			
11. Does he use one hand then the other, showing no definite hand preference?			
12. Is it necessary for him to sharpen his pencil frequently?			
13. Does he avoid or have difficulty with follow-the-leader games?			
14. If he participates in group activities, does he prefer to lead or be first?			
15. Does he avoid climbing activities?			
16. Does he consistently have difficulties in lining up activities (eg. is he excessively restless when standing in the lunch line)?			
17. Does he write very heavy (eg. will make dark lines and may often tear holes in his paper) or too lightly?			
18. Does he write very small?			
19. Does he write very large with no regard for lines?			
20. Does he frequently change the orientation of his paper when drawing or writing (eg. in drawing he may turn his paper so that it is necessary for him to only draw in one area or direction)?			
21. Does he have difficulty organizing his paper (eg. he may cramp his work to one corner, or draw along one edge, or he may not establish a pattern at all)?			
22. If cursive writing is required, does he often revert to manuscript (he may shift from one style to another often)?			
23. In copying written work, must he look back and forth from his paper to the stimulus (he may seem as if he cannot recall the stimulus long enough to reproduce it)?			

	+	0	–
24. Does he make many reversals when reading, writing, or doing arithmetic?			
25. Does he occasionally write or read letters upside down?			
26. Does he read very rapidly without pausing between sentences (he may read till he is out of breath before he pauses)?			
27. Does he pause after every word?			
28. Is it necessary for you to tell him to do one thing at a time (eg. he cannot follow a series of instructions)?			
29. Does he daydream frequently, stare blankly, seem to be attending to nothing?			
30. Does he often rub his eyes?			
31. Does he seem to blink a lot?			
32. Does he tend to cover or shade his eyes or single eye frequently?			
33. Does he squint his eyes often?			
34. Does he hold his book too close, seem to bend over his paper when writing, or move progressively closer to or further from his work?			
35. Does he tire quickly from reading or writing?			
36. Does he persist in using his finger to keep his place when reading?			
37. Is there excessive body shifting or movement when engaged in reading or writing task?			
38. Does he seem to be easily distracted by visual stimuli (eg. he may look frequently at the bulletin board or to other places in the room where there are many visual displays)?			
39. Does he seem overly dependent upon auditory input (eg. he may talk himself through activities; he may be able to follow verbal instructions but not written instructions)?			
40. Does he lay his head upon his arm or desk as he works?			
41. Does he have difficulty with copying task (eg. writing, drawing, reproducing geometric figures from memory)?			
42. Are his drawings distorted (figures too tall or of unrealistic proportion)?			
43. Does he put his shoes or boots on the wrong feet occasionally?			
44. Must verbal instructions be repeated several times?			
45. Does he seem to be distracted by classroom noise (eg. may put his hands over his ears [illegible]ally)?			
46. Does he often seem insensitivie to obvious auditory interruptions (eg. the bell ringing or the announcements of the intercom)?			
47. Does he seem to benefit more from written information than from verbal information?			
48. Does he talk too loud?			
49. Does he talk rapidly without taking time to breathe?			
50. Does he distort his facial expression when speaking (eg. may grimace or exaggerate the movement of his mouth)?			
51. Does he talk too softly or frequently whisper a response?			
52. Does he avoid speaking (eg. he may answer questions with single words or phrases; avoids spontaneous conversation)?			
53. Does he have difficulty repeating sentences or numbers?			
54. Is his language more echolalic than original (eg. he may repeat questions asked or always respond with a similar phrase)?			

APPENDIX D

EVALUATION AND INFORMATION FORMS

PURDUE PERCEPTUAL-MOTOR SURVEY SUMMARY SHEET

Name
Age
Race
Sex
Grade
School

GLEN HAVEN ACHIEVEMENT CENTER
Post Office Box 2153
Fort Collins, Colorado 80521

	Score 4	3	2	1		
Walking Board: Forward					Balance and Posture	
Backward						
Sidewise						
Jumping						
Indentification of Body Parts					Body Image and Differentiation	
Imitation of Movement						
Obstacle Course						
Kraus-Weber						
Angels-in-the snow						
Chalkboard Circle					Perceptual-Motor Match	
Double Circle						
Lateral Line						
Vertical Line						
Rhythmic writing Rhythm						
Reproduction						
Orientation						
Ocular Pursuits Both eyes					Ocular Control	
Right eye						
Left eye						
Push-up (convergence)						
Visual Achievement Forms Form					Form Perception	
Organization						

APPENDIX E

STATISTICAL DATA

FREQUENCY DISTRIBUTIONS
EXCLUDING SPECIAL EDUCATION SAMPLE

Table 130

FREQUENCY DISTRIBUTION: AGE LEVEL

Age Level (yr/mo)	Subject Frequency	Percent Of Total
No Data Recorded	16	
5.10 - 6.7	97	8.48
6.8 - 7.5	118	10.31
7.6 - 8.3	178	15.56
8.4 - 9.1	197	17.22
9.2 - 9.11	199	17.40
10.0 - 10.9	192	16.78
10.10 - 11.7	87	7.60
11.8 - 12.5	58	5.07
12.6 - 13.3	13	1.14
13.4 - 14.1	5	.44

Note.-- Based on total sample excluding Special Education classes.

Table 131

FREQUENCY DISTRIBUTION: INTELLIGENCE QUOTIENT LEVEL

IQ Level	Subject Frequency	Percent Of Total
No Data Recorded	490	
20 - 29	1	.15
30 - 39	2	.30
40 - 49	5	.75
50 - 59	6	.90
60 - 69	14	2.09
70 - 79	40	5.97
80 - 89	107	15.97
90 - 99	173	25.82
100 - 109	160	23.88
110 - 119	104	15.52
120 - 129	40	5.97
130 - 139	16	2.39
140 - 149	2	.30

Note.-- Based on total sample excluding Special Education classes.

Table 132

FREQUENCY DISTRIBUTION: LUNCH STATUS

Lunch Status	Subject Frequency	Percent Of Total
No Data Recorded	412	
Child Receives Free Lunch	159	21.26
Child Partially Pays	21	2.81
Child Pays Total	568	75.94

Note.-- Based on total sample excluding Special Education classes.

Table 133

FREQUENCY DISTRIBUTION: SEX

Sex	Subject Frequency	Percent Of Total
No Data Recorded	10	
Male	575	50.00
Female	575	50.00

Note.-- Based on total sample excluding Special Education classes.

Table 134

FREQUENCY DISTRIBUTION: RACE

Race	Subject Frequency	Percent Of Total
White	841	72.50
Black	314	27.07
Other	5	.43

Note.-- Based on total sample excluding Special Education classes.

Table 135

FREQUENCY DISTRIBUTION: RURAL-SUBURBAN-URBAN STATUS

Rural-Suburban-Urban Status	Subject Frequency	Percent Of Total
No Data Recorded	20	
Rural	566	49.65
Suburban	449	39.39
Urban	125	10.96

Note.-- Based on total sample excluding Special Education classes.

APPENDIX E

STATISTICAL DATA

CORRELATION OF PPMS ITEMS WITH PPMS CLUSTERS

Table 136

CORRELATION OF PPMS ITEMS WITH PPMS CLUSTERS

Item	Cluster I	II	III	IV	V	VI
Walking board-Forward	.2542	.3413	.6803	.2878	.0542	.3271
Walking board-Backward	.3433	.3445	.7720	.3068	.0433	.4197
Walking board-Sidewise	.2805	.3041	.7067	.3137	.1024	.3451
Jumping	.4416	.4759	.4290	.3911	.1642	.6571
Identification of Body parts	.3008	.3758	.2515	.3922	.2172	.5214
Imitation of Movement	.3141	.3489	.2649	.2801	.2098	.5446
Obstacle course	.2668	.2927	.3538	.3208	.1488	.3039
Kraus-Weber	.3529	.4289	.2571	.2580	.3209	.4462
Angels-in-the-Snow	.3971	.4546	.3376	.4171	.1778	.5868
Chalkboard- Circle	.3268	.4204	.3562	.6015	.2518	.4368
Chalkboard-Double Circle	.2171	.3265	.2395	.6379	.3047	.3514
Chalkboard-Lateral Line	.2823	.3585	.2967	.4461	.2331	.3383
Chalkboard-Vertical Line	.2268	.3484	.2413	.6321	.4418	.3591
Rhythmic Writing-Rhythm	.3377	.7524	.3797	.4815	.3890	.5011
Rhythmic Writing-Reproduction	.4088	.7671	.3555	.4847	.4343	.5276

Table 136(continued)

Item	Cluster I	II	III	IV	V	VI
Rhythmic Writing-Orientation	.3974	.8327	.4272	.5202	.3664	.5180
Ocular Pursuit-Both Eyes	.8594	.4637	.4004	.4537	.2518	.5284
Ocular Pursuit-Right Eye	.8598	.4291	.3558	.3069	.2044	.4987
Ocular Pursuit-Left Eye	.8768	.4486	.3767	.3533	.2067	.5294
Ocular Pursuit-Convergence	.5756	.3655	.3120	.3272	.2181	.4392
Visual Achievement-Form	.1747	.3355	.0580	.3308	.5505	.2198
Visual Achievement-Organization	.1270	.2545	.0928	.2463	.5357	.1418

Note.--These correlations are oblique factor coefficients.

APPENDIX E

STATISTICAL DATA

CORRELATION MATRIX OF PPMS CLUSTERS

Table 137

CORRELATION MATRIX OF PPMS CLUSTERS

Cluster	Cluster I	II	III	IV	V	VI	VII	VIII	Composite
I	-								
II	.41	-							
III	.33	.34	-						
IV	.37	.47	.28	-					
V	.18	.32	.05	.31	-				
VI	.50	.49	.35	.41	.18	-			
VII	.25	.26	.29	.25	.10	.24	-		
VIII	.32	.36	.20	.20	.22	.37	.13	-	
Composite	.73	.75	.59	.69	.33	.72	.40	.44	-

APPENDIX E

STATISTICAL DATA

CORRELATION OF CHECKLIST ITEMS WITH CHECKLIST CLUSTERS

Table 138

CORRELATION OF CHECKLIST ITEMS WITH CHECKLIST CLUSTERS

	Cluster				
Item	I	II	III	IV	V
3	.5001	.1731	.2663	.7139	.5265
5	.2227	.7163	.1397	.1372	.2016
6	.4665	.1727	.2449	.5797	.5049
7	.5205	.1809	.2636	.5544	.7168
10	.4643	.1611	.2707	.4870	.5577
16	.5042	.0463	.1537	.6015	.4624
17	.4031	.1715	.1682	.3912	.6325
23	.7096	.3265	.2645	.4456	.5406
28	.7686	.3383	.2108	.5058	.4763
29	.5606	.3729	.3075	.4636	.4319
30	.2347	.1602	.6847	.2485	.2634
31	.2180	.1890	.7551	.2355	.2377
32	.1556	.1680	.6266	.1603	.1615
35	.6137	.2413	.2322	.5056	.4964
36	.5283	.2037	.1895	.2948	.3959
37	.5503	.1253	.2245	.6064	.5349
38	.5982	.1789	.1997	.5862	.4548
39	.6699	.1775	.2105	.4700	.4829

Table 138(continued)

Item	Cluster I	II	III	IV	V
41	.7096	.2740	.2026	.4441	.5981
44	.7405	.2991	.2056	.5130	.5111
51	.1717	.6073	.1246	.0593	.1593
52	.3702	.6692	.2224	.2215	.3129
53	.5823	.4030	.1801	.4013	.4438

Note.--Items and Clusters included represent the revised Checklist; correlations from replicated data.

Note.--These correlations are oblique factor coefficients.

APPENDIX E

STATISTICAL DATA

CORRELATION MATRIX OF CHECKLIST CLUSTERS

Table 139

CORRELATION MATRIX OF CHECKLIST CLUSTERS

Cluster	I	II	III	IV	V
I	-				
II	.27	-			
III	.20	.08	-		
IV	.73	.13	.3(	-	
V	.54	.16	.22	.62	-

APPENDIX E

STATISTICAL DATA

CORRELATION MATRIX OF PPMS CLUSTERS WITH CHECKLIST CLUSTERS

Table 140

CORRELATION MATRIX OF PPMS CLUSTERS WITH CHECKLIST CLUSTERS

PPMS Clusters	Checklist I	II	III	IV	V
I	.23	.04	.00	.16	.15
II	.35	.10	.03	.18	.22
III	.17	.09	.05	.14	.12
IV	.24	.11	.04	.15	.14
V	.20	.01	.01	.09	.13
VI	.33	.10	.07	.22	.21
VII	.08	.02	-.03	-.01	.07
VIII	.25	.06	.09	.14	.16
Composite	.36	.12	.04	.24	.24

APPENDIX E

STATISTICAL DATA

CORRELATION MATRIX OF PPMS CLUSTERS WITH TENVAD ITEMS

Table 141

CORRELATION MATRIX OF PPMS CLUSTERS WITH TENVAD ITEMS

PPMS Clusters	TENVAD I	II	III	IV	V	Total
I	.11	.02	.14	.11	.15	.18
II	.17	.10	.13	.16	.21	.25
III	.01	.01	.10	-.04	.04	.04
IV	.06	.04	.10	.09	.11	.13
V	.09	.06	.06	.05	.07	.11
VI	.19	.10	.27	.20	.21	.32
VII	-.04	-.00	.03	.00	-.01	-.01
VIII	.15	.11	.16	.17	.19	.26
Composite	.11	.08	.20	.14	.16	.22

APPENDIX E

STATISTICAL DATA

CORRELATION MATRIX OF CHECKLIST CLUSTERS WITH TENVAD ITEMS

Table 142

CORRELATION MATRIX OF CHECKLIST CLUSTERS WITH TENVAD ITEMS

Checklist Clusters	TENVAD I	II	III	IV	V	Total
I	.07	.00	.15	.14	.08	.15
II	.11	.03	.07	.00	.04	.07
III	.04	.06	.05	.05	.02	.00
IV	.01	.03	.07	.06	.06	.04
V	.05	.02	.09	.04	.07	.07

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